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FEATURES



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o DRY CARGO

More doubts about dry bulk trade growth

arlier doubts about commodity import demand this year have been compounded by the negative effects of the coronavirus outbreak in China and elsewhere. Prospects for an increase, possibly only a limited one, in global seaborne dry bulk trade during 2020 as a whole are becoming a less realistic expectation.

The likely impact of the epidemic, on world economic growth and trade, cannot yet be estimated reliably. Clearer signs of the severity and length of the outbreak and its repercussions are awaited.

But a substantial setback seems increasingly plausible. Economists' guestimates of as little as a 0.25 percentage point reduction in world gross domestic product (GDP) growth, from previous estimates of over 3% expansion in 2020, probably represent the optimistic case.

IRON ORE

Last year global seaborne iron ore trade appears to have seen a small decrease after remaining flat in the previous twelve months. Almost three quarters of the total received by all countries is comprised of China's imports. These Chinese volumes increased marginally by under 1% to reach 1.07 million tonnes in 2019, which is mostly seaborne trade but includes some land movements.

Some forecasters were expecting resumed growth in iron ore trade during

2020, supported by a flat or increased volume into China accompanied by larger purchases by other importing countries. That outlook has begun to seem more difficult to envisage, however, as a result of the unfolding coronavirus effects, although it is not yet unachievable if circumstances improve in the next few months.

COAL

Seaborne coal trade is not so dependent on China as an importer, although this country comprises about one-fifth of the total, a major part. Although weakening influences on global coal trade have been apparent for some time, it remains unclear whether these will be sufficient to result in a downturn in 2020 after several years when an upwards trend was maintained.

Arguably the new circumstances in China do not necessarily imply that coal imports will decrease this year, but just add to the range of uncertainties. After rising by 18mt or 7% last year to reach 300mt (including land movements), the direction of change in the 2020 total, up or down (or flat) is still unpredictable, mostly. Coal consumption, domestic production and stocks levels, and government decisions are all unclear.

GRAIN & SOYA

Amid expectations of a significant increase in global grain trade during the present 2019/20 crop year ending June, many changes among the main

exporting countries are likely, as shown in table 1. These variations reflect exporters' harvests, stocks, domestic grain consumption and competition from other sellers on the world market.

According to the latest (February) International Grains Council report one of the biggest changes, compared with the previous crop year, is an expected big expansion of South America's exports of wheat plus corn and other coarse grains in 2019/20. From 75mt, the total is likely to increase by 26% to almost 95mt. The European Union could also see a sharp rise of 32% to 41mt. By contrast, US exports may be almost onefifth lower at 71mt.

MINOR BULKS

The minor bulk trade segment overall appears to have been a major support for dry bulk trade's limited growth last year. In particular bauxite movements continued to grow strongly and may have exceeded 135mt. China's bauxite imports were much higher, reportedly increasing by about 20mt to reach 102mt.

BULK CARRIER FLEET

In 2019 the world bulk carrier fleet's capacity grew by almost 4%, as shown by table 2, reaching 879 million deadweight tonnes at year-end. During the current year, the volume of vessels sold for scrapping is expected to be much larger than seen previously, restraining fleet expansion.

TABLE 1: MAJOR GRAIN EXPORTING AREAS (MILLION TONNES)

	14/15	15/16	16/17	17/18	18/19	19/20*
North America	108.2	102.9	122.0	113.6	118.0	101.0
South America	49.1	67.7	51.8	75.3	75.0	94.6
Black Sea	70.9	82.2	88.3	102.7	103.4	106.7
EU	48.1	46.9	34.6	30.1	30.8	40.7
Australia	23.5	22.0	31.9	23.7	14.1	13.2

source: International Grains Council *forecast, 27 February 2020

TABLE 2: WORLD BULK CARRIER FLEET (MILLION DEADWEIGHT TONNES)

	2014	2015	2016	2017	2018	2019*
Newbuilding deliveries	48.2	49.2	47.3	38.5	28.5	41.3
Scrapping	16.4	30.7	29.4	14.8	4.4	7.8
Losses	0.1	0.2	0.2	0.3	0.2	0.1
Other adjustments/conversions	0.1	-0.3	-0.7	0.0	0.0	-0.2
Net change in fleet	31.8	18.0	17.0	23.4	23.9	33.2
Fleet at end of year	763.1	781.1	798.1	821.5	845.4	878.6
% growth from previous year		2.4	2.2	2.9	2.9	3.9

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Brazil's exports to China have fallen sharply because of corona virus and prospects for the economy have been cut as a result

With almost a third of Brazil's exports destined for China — a much higher proportion than that for key commodities such as iron ore, soya beans and crude oil — Brazil is being seriously affected by the slowdown of the Chinese economy, following the outbreak of corona virus there, writes Patrick Knight.

Since early February, the Brazilian currency, the Real, has lost 16% of its value, falling to its lowest level ever, while the prospects for growth this year have fallen from the hoped-for 2.5%, to less than 1.5%. The value of the shares of many leading exporting companies, notably Vale, Petrobras, the Suzano pulp and paper company, as well as several steel companies, have fallen sharply. The total losses on Brazil's stock exchange amounted to US \$12 billions in the first two months of the year.

Brazil depends on the import of components for many of the motor vehicles assembled there, as well as electronic and electrical goods. Some factories in Brazil have been forced to halt production because of the interruption of supply. The drastic measures taken to halt the spread of the virus by the Chinese government, which no other country seems able to repeat, caused many ports, as well as mills and factories in that country, to virtually close.

Huge quantities of goods remained stuck, either aboard ships, or in storage, at least until early March, when the first efforts to get the economy moving again began to be taken by the Chinese authorities.

The fact so many containers, particularly refrigerated ones, vital for the export of Brazilian meats, notably beef, poultry and pork, remain unloaded in China, let alone



flowing back to countries such as Brazil, is a serious obstacle to the return to normality in trade.

In 2019, China was the destination for 220mt (million tonnes) of iron ore, 50mt of soya beans and meal and 5mt of crude oil. About two thirds of Brazil's exports of crude oil have been sold to China in each of the past two years, but since the outbreak of the corona virus, consumption of oil in China has fallen by about a third, or four million barrels a day. In addition, 4.6mt of market pulp went to China in 2019, but it is noted that despite the recent losses of the value of the Suzano company, demand remains high. Most of the pulp going to China is converted into tissue there, and this is greatly sought during the outbreak of the virus.

Also, 2.4mt of food, the great majority of that meat, was also sold to China in 2019. Demand for pork was particularly strong, following the outbreak of swine fever in China, which has forced a major reduction

> in the size of the Chinese herd, by far the world's highest. This outbreak, and the consequent need for less feed, had caused the world price of soya to fall slightly. But this has been ameliorated by the fact the US soya crop has been below average. More grain than usual is needed in Brazil itself, where the output of pork has been ramped up to

meet the increased demand from China.

More than a million tonnes of wood and the same amount of sugar was exported to China in 2019, as well as 600,000 tonnes of both animal feeds, mostly soya meal and vegetable oil.

Oil giant Petrobras, two thirds of whose fast growing exports of crude has been going to China in recent years, is looking round for other customers. Petrobras has also been hurt by the sharp fall in the price of crude, caused mainly by the slowdown in demand in China, something which has been so significant as to cause a measureable reduction in air pollution in China's cities. Petrobras depends on stability in three Asian countries hit by the outbreak of the virus, Japan and Singapore as well as China, because several very large production platforms are under construction there. Each platform has the capacity to produce 150,000 barrels of oil a day, and if they are not ready on time, Petrobras will suffer financially.

A relatively small number of individuals have been affected by the virus in Brazil, whose population, it must be remembered. is formed of descendants from several parts of the world, as well as 'mother' country Portugal. Sao Paulo, whose population exceeds 15 million, reputedly contains the second-largest number of people of Japanese descent in the world, and there are many thousands of Chinese, and South Koreans as well. Millions of migrants travelled from Italy to Brazil in the last century, as well as many from countries in the Middle East, and Eastern Europe. Regular flights connect the country's major cities with most cities in Europe, so keeping the virus out is proving difficult.



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Agriculture markets

faced with unprecedented challenges



The social and economic effects of coronavirus disease (COVID-19), that began in China has spread to the vast majority of countries around the world, have yet to be reckoned with. The World Health Organization (WHO) declared COVID-19 a pandemic on 11 March. In Europe, news that Italy had taken measures to contain the spread by locking-down its population, has since been followed by a number of countries and underlines the threat the virus poses for health authorities in the many countries affected. The economic fallout dragged down global equity and commodity markets, wiping trillions off share values. According to a group of former IMF chief economists, the world economy is suffering from a "wicked cocktail" of coronavirus and the dramatic response to limit its spread. They agreed that addressing public health needs was the first priority, but with a sharp

GLOBAL WHEAT PRODUCTION 2015-2019 (MT)							
	2016	2017	2018	2019	2020		
Europe	150	155	142	158	149		
EU	145	151	137	154	145		
E.Europe	5	4	5	4	4		
CIS Baltic's	130	142	124	130	136		
Russia	73	85	72	74	80		
Ukraine	27	27	25	29	26		
N &C America	99	81	87	88	89		
US	63	47	51	52	51		
Canada	32	30	32	32	34		
S America	29	26	29	28	28		
Argentina	18	18	20	19	19		
N East Asia	39	42	39	47	44		
Turkey	17	21	19	19	20		
F East Asia	256	269	264	271	274		
China	132	134	133	135	134		
Africa	22	27	29	26	28		
North Africa	14	19	21	18	18		
Australia	32	21	18	15	21		
Total	756	763	732	764	769		

Source IGC, USDA, UN trade — totals may not add due to rounding

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GLOBAL WHEAT SUPPLY & DEMAND 2016-2019/20 (MT)

	2016/17	2017/18	2018/19	2019/20
Production	756	763	731	764
Consumption	738	742	737	755
Trade	182	184	175	184
Stocks	263	284	278	287
China	115	131	140	148
Major exporter stocks*	72	73	63	57

Source: IGC, FAO, USDA-Production-mainly harvested Jul-Dec/Local marketing years *Argentina, Australia, Canada, US, EU, Kazakhstan, Russia, Ukraine

GLOBAL COARSE GRAIN SUPPLY & DEMAND 2016-2019/20 (MT)

	2016/17	2017/18	2018/19	2019/20
Production	1,419	1,361	1,396	I,403
Consumption	1,382	1,376	1,419	1,424
Trade	182	189	204	208
Stocks	386	371	348	327
China stocks'	224	223	211	199
Major exporters — grains*	182	189	204	208
Major corn exporters	89	80	75	68

Source: USDA -*Argentine, Australia, Brazil, Canada, EU, Russia, Ukraine, US

The IGC in January raised their estimate of China's corn stocks from 76.2mt to 190.6mt by the end of 2017/18

downturn likely, governments should prepare to spend significant sums to protect businesses and households. The Federal Reserve cut US interest rates joining forces with other central banks in providing stimulus packages in an attempt to prevent a more severe economic downturn and market disruption. With many uncertainties faced in assessing the impact of the virus, likely to vary significantly from sector to sector, the unfolding situation was further exacerbated by the Saudi Arabian/Russian dispute over OPEC production cuts, which led to oil prices collapsing from \$60 to \$30 per barrel within a few days. Agricultural commodity markets are braced for a cascade of negative factors lasting at least throughout the first half of this year. Against this backdrop, the prospect of a record global wheat harvest is timely.

RECORD WHEAT OUTPUT IN 2020

Wheat crops are making progress in Northern Hemisphere countries, with the winter wheat area and sowings in Russia and Australia expected to expand; by contrast in the US, EU and Ukraine they are expected to contract. Boosted by a 2% rise in the global wheat area the International Grains Council (IGC) forecast this year's wheat harvest to rise to an alltime high of 769mt, pointing to a further build-up of stocks, especially in China and India.

CANADA'S PLANTINGS TO RISE

Expansion in winter and modest fall in spring sown plantings, likely to push up Canada's production to 34mt (million tonnes). Lower returns have reduced US winter wheat acreage to 45m/acres — with wheat output of 50mt in 20/21.

FAVOURABLE PROSPECTS FOR BUMPER RUSSIAN CROP

Russian farmers planted 18.3m/ha (45.2m/acres) of winter grains, with wheat output to rise to 80-85mt in 20/21 at the





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EU WHEAT OUTPUT TO CONTRACT

Excessive and heavy rain reduced wheat seeding in the UK and in other EU countries.

Wheat output is lower in France 35.7mt, Germany 22mt and a smaller crop in Denmark, to reduce production to c.149–150mt in 20/21.

Record crop in India

High support prices stimulated increased acreage and plantings, record wheat production projected at 106mt in 20/21. In Pakistan favourable weather conditions and adequate supplies of agricultural inputs are expected to lead to a near average harvest of just over 25mt.

TIMELY RAINS FOR WHEAT

Australian growers begin sowing in April, with drought conditions easing. Large acreage, a return to trend-line yields and above average rains, expected to continue through to May over much of W. Australia, S. Australia, Victoria with average rains in New South Wales and Queensland; ABARES pegs the Australian wheat crop at 21.3mt in 20/21. Other analysts suggest a much larger wheat crop is possible.

RECORD WHEAT OUTPUT IN 2019/20

With the exception of Australia most of the major wheat exporting countries had larger crops, with global output forecast to rise by 33mt to 764mt in 2019/20.

ROBUST DEMAND FOR WHEAT FOR ALL USES

Wheat for all uses food/industry (+10mt) and feed (+8mt) increased by almost18mt to 755mt. Chinese Wheat Futures recorded their highest level as the efforts to contain the COVID-19 outbreak boosted short-term demand. "The lockdowns in China increased consumers'

SOYBEANS MAJOR PRODUCERS 2016-2019/20 MT

Countries	2015/16	2016/17	2017/18	2018/19	2019/20
US	107	117	122	121	97
Brazil	97	115	121	117	126-130
Argentina	59	55	38	55	52
China	12	13	15	16	18
India	7	11	8	11	9
Paraguay	9	9	10	9	10
Canada	6	7	8	7	6
Others	19	22	20	23	22
Total	316	349	342	359	340-344
Source: USDA					

demand for flour products, driving up ZCE wheat futures" according to China-based consultancy JC Intelligence.

RISING IMPORTS INTO TURKEY BOOSTS TRADE

Global wheat trade is raised by 9mt to 184mt reflecting larger imports into Turkey, Morocco, Bangladesh, China, Nigeria, Saudi Arabia and Thailand. Reports of a smaller Australian crop and less than ideal conditions in parts of the EU, Black Sea region supported wheat values. Large exports from Russia 35mt, the EU 32mt, US 27.5mt and Ukraine 20mt. In Argentina prices increased, unlike in other major exporters, on tight domestic supplies and the frenetic pace of shipping 13mt of exports, to avoid a higher export tax.

WHEAT STOCKS RISE BY END 2019/20

Global wheat stocks are forecast to rise by almost 9mt, but mostly in China and India, with major exporters stocks, lower. Commerzbank posit tighter supplies of wheat outside China, to support wheat values in 20/21.

STEEP FALL IN WHEAT VALUES

Wheat futures markets fell sharply up to mid-March as the virus spread rapidly beyond China to other countries stoking

GLOBAL SUPPL	Y & DEMANI	D OF MAJOR	OILSEEDS	2016–2019/	'20 (MT)
Oilseeds	2015/16	2016/17	2017/18	2018/19	2019/20
Production	524	574	582	597	580
Soybean	316	349	342	359	342
Trade	154	170	176	171	175
Crush	445	467	484	489	498
Meal use	302	316	327	325	333
Oil use	178	183	193	200	205
Stocks	94	109	117	130	117
Soybean	80	95	99	112	102
US	5	8	12	25	12
South America*	52	60	56	59	61

Source: *Brazil and Argentina; USDA/Meal use excl. fishmeal c.5mt

concerns about the impact on demand and the prospect of weaker economic growth. CBOT May '20 SRW wheat contract fell from a high of \$5.66/bu (18.02'20) to \$5.03/bu (12.03'20) a drop of 63c/bu. Paris (Matif) May '20 Milling Wheat contract fell from €193.75/t (18.02 '20) to €177.50/t (12.03'20). But rumours of increased Chinese demand for wheat and buyers in other countries anticipating households to stock-up due to the fast spreading virus expected to lend support.

CORN ACRES TO RISE BUT CHALLENGES FORMIDABLE

For US corn growers crop planting decisions are formidable — a drop in demand in all the countries affected by COVID-19, the collapse in crude oil prices to below \$30p/b crushed ethanol margins making the biofuel less appealing; lingering African Swine Fever (ASF); sales to China yet to materialise following Phasel of the trade deal and a bumper South American crop nearing harvest. USDA forecast farmers will plant corn on 94m/acres, trend yields of 178.5bu/acre and crop output c.390mt while prices are expected to decline in 20/21. Other analysts agree the 94m/acre is feasible, but likely to require a crop shortfall to support corn prices in later months in 2020.

INCREASING HEAT/DRYNESS ACROSS SOUTH BRAZIL AND ARGENTINA

Argentine growers are more likely to increase corn sowings to 6.3m/ha following the government's decision to raise the tax on corn exports of 12%, seen as less onerous than the tax proposed for soybeans.

Concern is focused on the increasing heat and dryness across Southern Brazil and Argentina, which could impact Brazil's second-corn crop plantings-CONAB forecast 20/21 Brazilian corn exports at 34mt. Rosario Board of Trade estimate Argentina's 20/21 corn exports at 33.5mt.

MAJOR OILSEEDS, MEAL & OIL SUPPLY/DEMAND 2018/19 (MT)

	Oilseeds			Meal			
	Prod	Trade	Crush	Stocks	Prod	Trade	Use
Soybeans	342	151	303	102	238	67	235
Sunseed	55	3	50	3	22	7	21
Rapeseed	68	15	67	6	39	6	39
Copra	6	*	6	*	2		2
Palmkernal	19	1	19	*	10	7	10
Peanuts	45	4	19	4	7	*	7
Cottonseed	45	I	34	2	16	*	16
Total	580	175	498	117	334	91	338
USDA: *less than 500,000/t Med totals avd fishmed							

USDA: "less than 500,000/t. Meal totals excl. fishmeal

FEED DEMAND DRIVES COARSE GRAIN USE

The global coarse grain harvest is forecast at 1.40bn/t in 2019/20, with a substantial but slightly lower corn crop and exceptional barley harvest. Overall demand is expected to rise to a record 1.42bn/t, outpacing supply for the third consecutive year. Feed use is the main driver. Demand for more varied dietsanimal as well as plant protein, stokes demand for feed grains projected to rise by 18mt to 866mt; food/industry use is expected to contract by 13mt to 558mt. Increases in feed use are projected for China, Iran, Mexico, Vietnam, Kenya and Egypt. Trade to rise to 208mt, stocks are expected to fall to 327mt due to lower corn stocks in China and the US; stocks in the rest of the world, excluding China, are lower at 128mt by the end of 2019/20.

BRAZIL'S CORN EXPORTS, FEED USE SUPPORT HIGHER PRICES

With a smaller US crop c.348mt, partially offset by better crops in China 261mt, Ukraine 36mt and potentially Brazil 101mt and Argentina 50mt, global corn output is forecast at 1.11bn/t. Brazilian farmers have been very aggressive sellers of corn for export in 2019 resulting from the

SOYBEAN & SOYBEAN MEAL-MAJOR IMPORTERS 2016-2018/19 MT

		Soybea	ins	Soybean meal			
	2017/18	2018/19	2019/20	2017/18	2018/19	2019/20	
EU	15	16	15	18	19	19	
Asia	109	99	105	21	21	21	
China	94	83	88		—		
S&C America	6	8	7	7	7	7	
N. America	6	7	7	3	3	4	
Mexico	5	6	6	2	2	2	
M.East/Africa	11	10	10	7	7	8	
Others	6	7	6	4	4	4	
Total	154	145	151	60	63	63	
Source: LISDA							

devaluation of the Brazilian real against the US dollar. At the same time China aggressively imported Brazilian pork, poultry and beef, the higher prices stimulated meat production in Brazil. "That in turn increased demand for corn in the domestic livestock industry, but exporters had already shipped supplies" said Arlan Suderman, of INTL FCStone Financial Inc.

CORN FOR FOOD AND INDUSTRY USE CONTRACTS

With ample supplies of wheat and especially barley demand for corn for all uses fell by 8mt to 1.135bn/t; the 4.1mt increase in feed use to 705mt offset by the

12mt reduction in food/industry use. Global corn trade is slightly higher at 173mt in 2019/20, with imports destined for China, the EU, Mexico, Vietnam, South Korea and other countries. US corn exports are lower at 47mt, with rising exports from Ukraine 32mt, Brazil 39mt and Argentina 34mt. Global corn stocks are expected to fall for the third consecutive season from 352mt to 297mt, most are held in China (199mt), the US 48mt and in other countries.

FEED MAKERS SNAP-UP CORN

The threat that COVID-19 will cause a global recession pressured corn prices





while providing opportunities for buyers like South Korea's Corn Processing Industry Association (KOCOPIA). In a recent tender among others, they purchased c.60,000/t of corn to be sourced from optional origins at c.\$206.98/t C&F including surcharge — additional port unloading, for arrival in South Korea around June 10. Futures Markets CBOT May Corn contract closed at \$3.52/bu (13 03'20). Export bids-Argentine (up river) \$167/t; US 3YC (Gulf) \$171/t (13.03'20).

BARLEY AREA TO FALL IN 20/21

Due to weaker returns global barley area could fall by 1% in 20/21. ABARES expects that global demand for feed barley will recover gradually, reaching pre-ASF levels towards the end of 24/25; partly due to issues containing ASF in China and the extent other meat producers can ramp-up production, to fill the gap. Global barley output at a record high 156mt in 2019/20, with a large harvest in the EU 59m/, and in other countries. Feed use touched 106mt an increase of 12mt as feed makers switched to barley. Trade increased to 29mt on imports into China, Iran and Saudi Arabia. Barley values have fallen-Russian Barley for March Delivery FOB Novorossiysk \$175p/t.

SORGHUM PRICES FIRM ON SALES TO CHINA

In 20/21, sorghum production is expected to be similar to previous years. During March there has been increased activity with potential sales to China of 175,000/t — China is expected to import 4.7mt of sorghum by end of 2019/20. Prices remain firm on recent uptick in export sales to China. Sorghum FOB NOLA (May) \$195.17 (12 03 '20).

DROP IN CRUDE OIL, THREAT FOR SOY AND RAPE BIOFUELS

Global macro-economic worries continue to dominate oilseed and other markets. US farmers forecast to plant 85m/acres to soybeans will be influenced by several developments including: low returns, the impact of measures taken to combat the COVID-19 and its effect on demand; large competing crops and a dispute between Russia and Saudi Arabia about cuts in oil production — Brent Crude closed down at \$35.20p/b (Mar 13 '20). The fall in crude oil prices in turn weighing on values of soybeans and rapeseed, both are used to produce biodiesel; low crude prices, reduces the incentive to include biodiesel in transport fuels, impacting demand and prices for vegetable oils and oilseeds.



OILSEED OUTPUT 580MT IN 2019/20

Global oilseed production is forecast lower at 580mt in 2019/20, due to a lower crops of US soybean, rapeseed and groundnut, partially offset by better soy prospects in Brazil, Argentina and larger crops of sunflower seed, cotton seed and palm kernel.

Trade is increased to 175mt with crush expanded by 9mt to 498mt. Meal use in 2019/20, is increased to 333mt reflecting a stronger recovery in China's hog industry and higher crush forecasts for Argentina, Brazil and Russia. Global stocks forecast to fall to 117mt.

BRAZIL SHIPMENTS SETS RECORD

Firm international demand supported prices in Brazil and helped by a weak currency, farmers sold beans for export at a faster pace. In Argentina, an anticipated hike in the export tax (33% on soybeans, meal and oil) also leant urgency to exports. Despite weather-related delays, Brazil's shipments are likely to set records in March with over two-thirds of their exports sent to China.

DRY WEATHER IN **A**RGENTINA

Brazil is expected to produce a bumper soy crop expected to be well over 126mt; In Argentina dry weather is becoming notable-the Buenos Aires Grain Exchange cut its forecast for the soybean crop to 51.5mt.

Trade is lifted due to import demand by China, while higher shipments are anticipated from the US and Brazil. Brazil's soy exports are forecast to rise to 77mt and possibly more in 19/20 — Safras & Mercado noted sales projections soared in March, with 74mt of soybeans already sold; sales of the 20/21 crop also showing significant upturn.

TARIFFS ON US SOYBEANS LIFTED FOR SOME CHINESE CRUSHERS

Recent exemptions on US soybean tariffs granted for some crushers in China, lends support to the notion that China is attempting to meet its commitments under Phase I of the trade deal. Uncertainty about the impact of COVID-19 and other key issues looks to set market expectations over the near term-soybean prices will reflect this uncertainty, with volatility likely to remain high. Futures CBOT Soybeans May contract closed at \$8.486/bu (13 Mar '20)

POULTRY SECTOR HIT HARDEST

The COVID-19 outbreak in China is compounding a series of challenges for its farmers and feed millers, given those sectors were in recovery mode after last year's trade war between the US/Beijing and from the devastating outbreak of African Swine Fever (ASF). In this latest threat to the animal species, poultry has been hit hardest in the first quarter resulting from the closure of the live bird market in China. Facing discouraging margins and weak demand, small and medium scale poultry farms are reducing feed rations/culling chickens to cut feed costs. China's hog herd rebuilding-on the back burner-construction of new hog farms suspended due to logistical challenges and labour shortages. The spread of the virus has caused major disruption to the Chinese livestock farming and feed production industries.

HIGHER MEAT PRICES TO STIMULATE FEED REBOUND IN CHINA

Rabobank's Leif Chiang expects feed consumption to rebound in China, in response to high meat prices in 2021; suggesting that the virus is likely to impact feed demand in China in the first and early in the second quarter. Providing there is no recurrence and that ASF is under control, Rabobank expects China's feed consumption to rebound in the second half of the year-broilers to expand and hog herd restocking from the third quarter and recovery in demand in group dining and food service in China. Rabobank forecast Chinese feed consumption to show marginal growth of 2-3 per cent in 2020 followed by slightly stronger rebound in 2021. DCi

ClassNK completes joint feasibility study on 3D model based approval with JMU and NAPA

Major classification society ClassNK, Japan Marine United (JMU), and NAPA have completed a joint feasibility study on 3D model based plan approval using 3D CAD models as part of its technical investigation project.

Shipbuilding designs are gradually transitioning from 2D drawings to those designed with 3D CAD software. Classification societies, whose plan approvals are currently based mostly on 2D drawings, are also required to develop a scheme for 3D CAD models from their submission to their examination completion.

This project was conducted to examine the technical development required in each process of plan approval by JMU, NAPA, and ClassNK to realize 3D model based plan approval. In the feasibility study, ClassNK conducted a trial evaluation for hull structural design on a 3D CAD model of 300,000DWT ore carrier designed and created by JMU, using 'NAPA Designer' (*1), a 3D CAD software application for ship design developed by NAPA, as a 3D model viewer. Plan submission, storage, and notification of examination results were made using the Society's electronic plan examination system 'NK-PASS' (*2).

The investigation concluded that information required for class approval can be confirmed through a 3D CAD model, and that 'NK-PASS' is also compatible with 3D CAD models. The results of this survey will serve as a basis for future technical studies, and the Society will continue to work with the industry to realize 3D model based plan approval.

Speaking on the occasion, Mr. Hayato Suga, Corporate Officer and Director of Plan Approval and Technical Solution Division said "This study has proven the future potential of 3D model based approvals. 3D based design can be the key to improving digital solutions in the ship industry, including the ship design process, approval process and later fleet maintenance. I hope that the entire industry will also quickly realize the many opportunities and increased efficiency that can be achieved as a result of this initiative. The vessels of the future will be able to accommodate much better and safer designs in shorter amounts of time." SOME THINK THAT RAW MATERIALS TRANSPORT REQUIRES TRUCKING. WE THINK DIFFERENT.

BEUMERGROUP

^{*1 3}D CAD software for ship designs developed and sold by NAPA. For more information visit www.napa.fi

^{*2} Plan review system provided by the Society which can be used to send plans, check/ manage review progress, and receive returned plans.



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Jotun Hull Skating Solutions Always clean hull – For the most challenging operations

JOTUN

The HullSkater is a revolutionary onboard solution specially developed for proactive cleaning. Together with the premium antifouling SeaQuantum Skate, Jotun Hull Skating Solutions will maintain a clean hull, even in the most challenging operations.

Operational needs arising from a dynamic market in combination with challenging environmental conditions increase the risk of fouling. The end-result being increased fuel cost and Green House Gas emissions. To combat fouling, Jotun Hull Skating Solutions is engineered to keep the hull fouling-free at all times. This groundbreaking approach is now in the final verification stage, in collaboration with leading industry partners.

Wallenius Wilhelmsen



DNV·GL



Read more about Hull Skating Solutions on jointherevhullution.com

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BERGEBULK

Proactive measures needed to improve hull performance

While owners have long recognized the link between clean hulls and lower fuel costs, lack of reliable data has slowed investments in optimizing hull performance. But with improved sensor technologies and data analysis tools, hull performance is getting a second look.

Owners seeking to lower fuel costs and comply with pending regulations on emissions and invasive species often look to equipment manufacturers to meet their needs. From new efficient engine designs to alternative fuels, scrubbers to ballast water treatments systems, owners face some expensive decisions. But with more vessels now equipped with onboard sensors and standardized tools to measure speed loss due to hull fouling, owners and fleet managers now have access to reliable data measuring the impact of hull and propeller performance over time.

TEN-YEAR STATISTICS: THE LINK BETWEEN HULL PERFORMANCE AND VESSEL EFFICIENCY IS MUCH STRONGER THAN PREVIOUSLY THOUGHT

According to Jotun Marine Analyst Manager Manolis Levantis, Jotun Marine has collected data on hull performance from different types of vessels on different trades for more than decade. "Jotun's Hull Performance Solutions requires participating vessels to install sensors to enable performance monitoring based on standardized principles (ISO 19030) for the measurement of changes in hull and propeller performance," he explains. "Since then, the company has amassed one of the industry's most comprehensive data sets on hull performance."

Levantis says that hull and propeller

performance have a much larger impact on vessel efficiency than previously thought. "We estimate that the average yearly speed loss for all vessel types and trades, regardless of what anti-fouling is used, is about 6%," he says. "For a typical bulk carrier, compensating for this speed loss would require an increase of power of up to 18%, resulting in higher fuel costs and GHG emissions."

Levantis is careful to note that Jotun's data is taken from owners and fleet managers who are committed to improving hull performance. "When you consider that low freight rates over the past five years have discouraged many owners from investing in premium anti-foulings or sensor technologies, the market speed loss average may exceed 6%."

CASE STUDY: FUEL SAVINGS OF US\$1.5 MILLION

While Jotun does not usually share customer data, the company worked in co-operation with Gearbulk in 2016 to measure hull performance. Gearbulk, which operates the world's largest fleet of open hatch gantry and semi-open jib craned vessels, shared historical performance data from the cargo ship *Penguin Arrow* dating from January 2000, allowing for a full comparative analysis.

After installing sensors and applying Jotun's premium anti-fouling, (SeaQuantum x200), Jotun was able to monitor speed loss over a 60-month period. The results indicated a speed loss of just 0.5%, resulting in an estimated fuel savings of US1.5 million and a corresponding reduction of CO₂ emissions of 12,055 tonnes.

"Our data conclusively proves the link



between hull performance and fuel efficiency," says Levantis. "And with the IMO's pledged to reduce the total annual GHG emissions by at least 50% by 2050 compared to 2008, we believe hull performance will play a greater role in helping owners and fleet managers comply with pending regulations."

THE COST OF FOULING: SIGNIFICANT **CO**₂ EMISSIONS AND CLAIMS RELATED TO CHARTER PARTY AGREEMENTS

According to the Clean Shipping Coalition, the only international environmental organization that focuses exclusively on shipping issues, poor hull and propeller performance accounts for around 10% of the world fleet's energy consumption, translating to about US\$30 billion in additional fuel costs for the world fleet, every year. Burning this fuel adds 0.3% to shipping's total greenhouse gas output, which, according to the IMO, is about 2.2% of the world's total — about the same output as Germany.

Failure to prioritize hull performance not only result in additional fuel costs, but also may expose owners to claims related to charter party agreements or additional costs for periodic underwater hull cleanings. At the same time, port authorities in Australia, New Zealand, California and the EU have become increasingly sensitive to biofouling risk, placing new requirements on owners.

NEXT GENERATION HULL MAINTENANCE: SHIPPING SEEKS A MORE PROACTIVE APPROACH

While new anti-fouling technologies have drastically reduced speed loss between drydockings and more ports are offering advanced ROV hull cleaning services, pending regulations on emissions and invasive species will require a more proactive approach to hull maintenance. Increasingly, owners are seeking solutions to manage hull performance more effectively between dry dockings, when fouling occurs. After all, removing slime before marine organisms can attach to the hull would not only improve vessel efficiency and lower GHG emissions, but also help control the spread of invasive species.

"The industry now has access to historical data that makes a strong business case for optimizing hull performance," says Levantis. "As an analyst, I believe what can be measured can be managed — we don't have to guess anymore."

Staying safe at sea

and all along the supply chain

The concept of staying safe at sea has changed dramatically in the last few weeks. The global COVID-9 crisis has shaken everybody, and is a stark reminder to us all of the importance of keeping populations fed and well-provisioned.

This does not mean, of course, that the other threats to safety in the maritime world have gone away, so this article will also include details of other essential measures to keep all those in the supply chain safe and well.

The dry bulk industry cannot 'shut up shop' and wait for these difficult times to pass. Therefore, all the players in the industry are doing what they can to keep the supply chain safe, for the sake of their own staff, their clients, as well as the endusers.

A range of measures is being implemented. For example, a crew specialist has urged ship operators to exercise caution when making crew changeovers while the coronavirus outbreak continues to rampage across the globe.

SAFEGUARDING THE CREW IN A TIME OF CRISIS

Responding to industry calls for seafarers to be given special travel dispensation, Henrik Jensen, managing director of Danica Crewing Services, warns that crew face a bigger risk of catching the virus while they travel to and from postings. Better to extend contracts where possible, he advises, warning that merchant vessels are ill-equipped to care for seriously ill seafarers. Jensen commented: "Some vessel operators think it is stressful for crew to stay onboard for longer and better for them to go home — I disagree. That may well be the case for crew who have completed postings of more than nine months. However, for those with contract lengths of four to seven months, or less, I think it is not a problem to stay longer, rather than risk becoming infected as they transit home, or to jeopardize the health of those remaining by potentially bringing infected seafarers on to the vessel in replacement," he explained, pointing out that the MLC does allow a maximum term

of 12 months at sea.

He warns that the risk to seafarers falling ill at sea is far greater than for those coming ashore:"If the homebound seafarer gets infected then hopefully the medical care systems in their home country will be able to cope. What really concerns me is what will happen to an infected seafarer onboard. "Firstly, no commercial vessels are equipped to deal with a crew member seriously ill from coronavirus Covid-19 who may be in need of ventilation and intensive care. Help could be very far away if the vessel is on a long voyage — and even may not be readily available in port. Secondly, if the virus comes onboard then it will almost certainly affect several persons, if not the entire crew. Will the ship then be able to operate in a safe way? How can vessel operators provide medical care to an entire crew far out at sea?

"In my opinion, the safest way – although inconvenient and potentially stressful for the individual seafarer – is to halt the crew changes until the situation is under better control."

Massive expansion of testing & protections needed to protect supply chains

The British Ports Association has called on the UK government to broaden the scope of testing and ensure that those working to keep the country supplied with imported food, energy and medicines are protected.

The UK ports industry is co-operating very closely with the Department for Transport and other agencies and the sector understands and supports the need to prioritize clinical staff and frontline emergency workers.

As soon as capacity can be made available for wider testing, this should be extended to key workers in the transport and logistics sector to ensure that food, energy and other critical goods continue to flow through ports.

Port professionals, including marine

pilots, play a critical role in facilitating 95% of UK trade. Half of the county's food imports come through its maritime gateways and those port workers responsible for making it happen have been identified as 'key workers' by the government.

Goods including food, medicines and energy continue to flow into the country. However, like many other parts of the economy some port operators are concerned about cash flow issues and the impact on the financial status of their customers, particularly ferry companies and other passenger focused activities such as cruises.

There are also planned slow-downs such as in automotive manufacturing which

could be costly for the port and logistics industry. Government support packages have been welcomed by ports.

There has been an unprecedented effort by the health care sector and it is clear that the need to allocate testing and other materials across the NHS (National Health Service) comes first and foremost. However, there is now a pressing need to ensure that port gateways also have the protections they need such as sanitizer, masks and testing equipment so that they can continue to function effectively in the coming weeks and months. This will help ensure resilience of UK supply chains.

PPE supplies – sanitizer, masks, etc. – are beginning to run low in some ports and this may soon start to have a knock-on effect.

Cargill donates disinfecting alcohol

Cargill, one of Europe's largest alcohol producers, has donated a first batch of 60,000 liters of disinfecting alcohol to the health sector in the Netherlands. Through the Ministry of Health, Welfare and Sport (VWS) this will be distributed to hospitals and other healthcare institutions in the Netherlands where a shortage has arisen as a result of the COVID-19 crisis. Niels Maijers, Coordinator National Corona Taskforce on behalf of the Ministry of Health, Welfare and Sport: "This enables us to ensure the availability of surface disinfection."

Since the rapid global spread of the COVID-19 virus, the demand for

disinfecting alcohol — to sanitize surfaces — has increased dramatically, and many health institutions throughout Europe are facing imminent shortages. Last week Cargill decided to put its alcohol production in Europe at the service of this crisis and to make a first donation of 60,000 liters to the Dutch government. This disinfecting alcohol is produced by its employees at Cargill's Sas van Gent plant in Zeeland. Recently, a collaboration with the Ministry of Health, Welfare and Sport was set up. The 60,000 litres of disinfecting alcohol is to be distributed across the healthcare sector to support hygiene.

Alain Dufait, Managing Director Cargill

Europe: "Cargill not only supplies essential food ingredients for humans and animals, but also alcohol for the drink and health industry. Our people are working around the clock to keep our factories operating at full capacity across Europe. It's no easy task because at the same time, we're also strengthening our hygiene measures so that our people can do their jobs safely. We take our responsibility to continue to supply the food and health industry very seriously. In addition, we want to do our bit to help the government to optimally support and care for all sick patients. This will also enable medical staff to work more safely."

Panama Canal adopts sustained operations amid COVID-19

Following the mandatory countrywide lockdown announced by the Panamanian Government to combat the COVID-19 pandemic, the Panama Canal has adopted new measures to guarantee the continuity of its operation and prevent the further spread of the virus, safeguarding its workforce and the safety of its customers.

These measures include:

- The creation of teams with the necessary staffing levels in order to maintain the safe operation of the waterway and provide continuous service to international trade.
- These teams will be transferred to and from their work areas in special transport and in small groups, with the aim of reducing the risk of

infection.

 Operational shifts will be established to ensure that all workers are adequately rested.

The health and wellbeing of the Panama Canal team is the top priority. The



measures implemented are in addition to those that have already been implemented to protect employees, customers and crew of ships in transit since the announcement of the global alert for COVID-19, in accordance with Panama Canal regulations and recommendations from the Ministry of

Health of Panama (MINSA) and the World Health Organization. The waterway has also been coordinating with MINSA to navigate the situation and raise awareness among the greater public.

The Panama Canal acknowledges the role it plays in ensuring the global flow of cargo and is working to continue providing a safe and reliable service. It is closely following the situation and communicating with staff and customers.

PSM details the importance of digital tank guaging to ensure overall safety

SHIFTING HORIZONS

Ship design has undergone a significant transformation over the last decade and is set to change even more radically over the next twenty or thirty years, as vessels become increasingly automated and the industry rises to the challenge of complying with new safety and environmental regulations. Operational practices, too, are changing, redefining the human-machine interface. *Mark Jones of PSM* looks at the role of digital tank gauging in integrating systems and people with safety in mind.

Despite huge improvements in safety, accidents with sometime fatal outcomes still occur. Often overshadowed in the drive to deliver ship-wide automation systems, tank level measurement plays a vital role in maintaining ship safety and efficiency. Regular level measurement is essential to maintain ship stability.

Climate change is also an increasing complication for seafarers and an additional threat to ship handling and stability. Weather extremes were in fact ranked a top risk by The Alliance Risk Barometer 2018, contributing to uncertain conditions at sea.

Now widely established in modern fleets, digital sensors and transmitters such as those supplied by PSM offered a first step towards smarter ships, with greater accuracy and real-time monitoring helping to eliminate the risk of undetected hazards potentially capable of flooding and/or sinking vessels in minutes.

Modern digital tank gauging systems are designed to be flexible, capable of handling process control across the full range of shipboard fluid types, from fuel oil and lubricants to ballast water. Intelligent sensors collect real-time data from all onboard storage tanks including anti-rolling

Titanium construction transmitter detail.





tanks and measurement of the ship's draught and trim, as well cargo tanks and water ingress detection.

Sensors and transmitters, which are designed for temperature, pressure and level measurement, are typically networked via an onboard system which uses distributed termination modules to acquire the data collected and relay it to a centralized graphic display unit, which

Programmable pressure transmitter provides content indication and alarm status for all tanks.

A NEW DIRECTION

The future of digitalization, however, lies in continual progression, as critical operational processes are broken down and rebuilt, with new challenges to be met, requiring a different approach to systems design.

Ships crews, relieved from repetitive tasks, are increasingly taking on additional duties, putting them under extra time pressures. Staying competitive and adapting to changing market conditions requires a quick turn-round in the shipyard for refits and fast-tracking new builds. Minimizing downtime for vessels in service by shortening the time in drydock and ready availability of spares is also essential for fleet owners.

SIMPLICITY IS THE KEY

Launched last autumn, PSM's new Versatile Process Monitoring System (VPMS) is one of a new breed of tank level measurement solutions, designed to provide an integrated, fully featured and above all, simple system.

Ease of installation without the need for specialist knowledge and high visibility were key considerations in the development of the VPMS system. Single wire, multi-drop connection via purpose-designed termination modules offers rapid installation, with all transmitters being interrogated and controlled by a new style simple to read centralized display. A further defining characteristic of this latest solution

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is the built-in flexibility which enables customer-specific customization and upscaling within the standard design.

The next generation intelligent hydrostatic transmitters included with the new system can be pre-configured prior to delivery with all parameters specific to the intended application. This means installers can connect the system and set to work immediately while retaining the ability to fine-tune settings on the spot using a laptop computer.

Equally important, given the multiple pressures on ships' engineers, should component replacement at sea be required, the smart technology behind PSM's new style hydrostatic sensors allows the crew to drop a new transmitter into place and instruct it what to do in minutes.

Electro-pneumatic gauging or 'bubbler' technology remains the preferred option for level measurement for some vessel owners and operators, with benefits including ease of access for sensor checking and replacement and no deck cabling or active equipment in the tanks.

The flexibility of the new VPMS system allows specifiers to select

between the two types of transmitter to suit the application and preferences.

IN PLAIN SIGHT

A key objective for PSM in maximizing ship safety has been to maximize 'view on deck' opportunities for ease of use. PSM's new VPMS allows repeater displays to be installed to provide function-critical information at additional locations to enable the ships' crew to access information directly, allowing employees to be proactive in responding to potential safety issues. Easy access to cabinets located in safe areas allows routine checks and tests to be carried out easily and quickly.

ON COURSE FOR SUCCESS

Whatever the future face of shipping, one thing that remains a constant is safety. Fully automated ships may still be some way off, meanwhile manufacturers and suppliers including PSM continue to support the digitalization process through research and development in the move towards 'smart' systems which can assist the ship owners to ensure vital safety standards are met, while maintaining profitability and improving efficiency.

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Solis Marine launches global Fire and Chemicals emergency response consultancy

Solis Marine has introduced a global Fire and Chemicals emergency response operation. The new division will be led by global expert Sander Loef who will be based out of a new strategically located office opening in the Netherlands.

Sander Loef joins Solis Marine as Marine Consultant, Fire and Chemicals Specialist, and becomes General Manager of the Rotterdam based operation. His appointment meets client demand for specialist advice in relation to fire, chemical and oil spill response and risk assessment.

Going forward, Solis Marine will now offer on-site attendance or remote advice round the clock to clients for the investigation of fire and chemical incidents involving all vessel types, cargo fire or spills in port, offshore or at sea.

Loef is an acknowledged marine fire and chemicals expert and has been involved in a number of emergency response operations worldwide. Over the past 17 years he has worked as a firefighting expert, dangerous goods and hazmat specialist and oil spill response coordination and safety officer. He also brings experience in maritime commercial, operational, logistical, financial, legal and insurance matters. Loef has also investigated a number of incidents and provided expert reports including giving expert evidence in court and tribunals.

Loef has previously held senior positions at international consultancies. His expertise complements the existing strengths of the Solis Marine casualty management team and its multi-disciplined







approach to incident investigation.

Solis Marine Consultants co-founder and Senior Partner Captain John Simpson said: "We are developing our services to meet client demand for specialist fire and chemical advice and risk assurance. The arrival of Sander means we can expand our operations into an area of growing risk which is generating significant losses for the industry."

"We see significant demand for our core services of casualty management, casualty investigation, expert witness and distressed cargo management, and also for our project cargo and marine warranty services. As with all of our offices, our new base in Rotterdam will provide support to Solis Marine's clients on a worldwide basis as well as providing direct support to our growing client base in Europe."

"The Port of Rotterdam is the largest in Europe and a major maritime hub and so this was a natural choice of strategic location for Solis Marine's latest expansion in Europe as we look to grow our global footprint and the range of client services we offer."

Loef said: "Fires and explosions on board vessels continue to generate very large losses. Insurers have rightly flagged incidents like these as a growing risk in recent years. The combined expertise and know-how provided by Solis Marine allows for a pragmatic approach to help investors, owners, financial institutions, insurers and cargo interests take concrete steps to mitigate the risk of fire and chemical marine disasters."

As well as incident investigation, Solis Marine also specializes in salvage cases, acting on behalf of insurers, insured interests and salvors. Work undertaken will now include the constant monitoring and control of operations and potential and existing hazardous situations involving combustible, polluting and chemical spills.

In addition, Solis Marine will provide risk assurance to help clients navigate complex law and jurisdiction regards fire safety by assessing compliance and evaluating risk.

ABOUT SOLIS MARINE

Solis Marine was established in the UK and Singapore in 2012 to provide independent expert advice on maritime and shipping incidents. A third office was opened in Hong Kong in 2013 to expand

on operations in the region and to extend the range of services and expertise provided by the organization.

In 2017 Solis Marine expanded into China with an office based in Shanghai and this was followed by further offices in Qingdao and Xiamen in 2018 with a team of six staff between the offices providing general survey services as well as incident response in these areas.

Solis Marine has recently opened its first office in continental Europe in Rotterdam, introducing a global Fire and Chemicals emergency response operation and risk assessment to our suite of services.

Senior consultants within the company have all given expert evidence in court or arbitration and Solis Marine also has three Special Casualty Representatives on the panel at Lloyd's who have been heavily involved in a number of high profile and politically sensitive wreck removal and salvage operations. Naval architects all have practical salvage and wreck removal experience working both on behalf of vessel owners/insurers as well as for salvors directly.

Expert reports have been prepared for court and arbitration hearings on collisions, groundings, tugs and manoeuvring, unsafe ports and berths, cargo issues, passage planning, fire, chemical and oil spill response, personal injury, vessel operations, prudent seamanship and damage to submarine pipelines.

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IMO weighs in on the subject of bulk carrier safety

Bulk carriers were developed in the 1950s to carry large quantities of non-packed commodities such as grains, coal and iron ore, writes the International Maritime Organization. Some 5,000 bulk carriers trade around the world, providing a crucial service to world commodities' transportation.

Bulk carrier operators must be aware of the specific safety concerns related to this type of ship. Loading of cargo must be done carefully, to ensure cargo cannot shift during a voyage leading to stability problems. Large hatch covers must be watertight and secure.

INTERNATIONAL MARITIME SOLID BULK CARGOES CODE (IMSBC CODE)

The International Maritime Solid Bulk Cargoes Code (IMSBC Code), and amendments to SOLAS chapter VI to make the Code mandatory, were adopted by the Maritime Safety Committee (MSC), 85th session, in 2008. The amendments entered into force on I January 2011. The IMSBC Code replaces the Code of Safe Practice for Solid Bulk Cargoes (BC Code), which was first adopted as a recommendatory code in 1965 and has been updated at regular intervals since then.

The aim of the mandatory IMSBC Code is to facilitate the safe stowage and shipment of solid bulk cargoes by providing information on the dangers associated with the shipment of certain types of cargo and instructions on the appropriate procedures to be adopted.

The international Code of Safe Practice for Solid Bulk Cargoes (BC Code) includes recommendations to governments, ship operators and shipmasters. Its aim is to bring to the attention of those concerned an internationally-accepted method of dealing with the hazards to safety which may be encountered when carrying cargo in bulk.

The Code highlights the dangers associated with the shipment of certain types of bulk cargoes; gives guidance on various procedures which should be adopted; lists typical products which are shipped in bulk; gives advice on their properties and how they should be handled; and describes various test procedures which should be employed to determine the characteristic cargo properties. The Code contains a number of general precautions and says it is of fundamental importance that bulk cargoes be properly distributed throughout the ship so that the structure is not overstressed and the ship has an adequate standard of stability. A revised version of the Code was adopted in 2004 as Resolution MSC.193(79) Code of safe practice for solid bulk cargoes, 2004

SOLAS CHAPTER XII ADDITIONAL SAFETY MEASURES FOR BULK CARRIERS

Following a spate of losses of bulk carriers in the early 1990s, IMO in November 1997 adopted new regulations in SOLAS containing specific safety requirements for bulk carriers, Chapter XII – Additional Safety Measures for Bulk Carriers. In the same month, the 20th Assembly of IMO adopted the 'BLU Code' — the Code of Practice for the safe loading and unloading of bulk carriers (resolution A.862(20).

Following the 1998 publication of the report into the sinking of the bulk carrier *Derbyshire*, the Maritime Safety Commitee (MSC) initiated a further review of bulk carrier safety, involving the use of Formal Safety Assessment (FSA) studies to help assess what further changes in regulations might be needed.

In December 2002, at its 76th session, the MSC adopted amendments to SOLAS chapter XII and the 1988 Load Lines Protocol and also agreed to a number of recommendations to further improve bulk carrier safety.

In December 2004, the MSC adopted a new text for SOLAS chapter XII, incorporating revisions to some regulations and new requirements relating to doubleside skin bulk carriers. These amendments entered into force on I July 2006.

SOLAS CHAPTER XII – ADDITIONAL SAFETY MEASURES FOR BULK CARRIERS

The new SOLAS chapter XII Additional Safety Measures for Bulk Carriers was adopted by Conference held in November 1997 and it entered into force on I July 1999.

The regulations state that all new bulk carriers 150 metres or more in length (built after 1 July 1999) carrying cargoes with a density of 1,000kg/m³ and above should have sufficient strength to withstand flooding of any one cargo hold, taking into account dynamic effects resulting from presence of water in the hold and taking into account the recommendations adopted by IMO.

For existing ships (built before I July 1999) carrying bulk cargoes with a density of 1,780kg/m³ and above, the transverse watertight bulkhead between the two foremost cargo holds and the double

bottom of the foremost cargo hold should have sufficient strength to withstand flooding and the related dynamic effects in the foremost cargo hold.

Cargoes with a density of 1,780kg/m³ and above (heavy cargoes) include iron ore, pig iron, steel, bauxite and cement. Lighter cargoes, but with a density of more than 1,000kg/m³, include grains such as wheat and rice, and timber.

The amendments take into account a study into bulk carrier survivability carried out by the International Association of Classification Societies (IACS) at the request of IMO. IACS found that if a ship is flooded in the forward hold, the bulkhead between the two foremost holds may not be able to withstand the pressure that results from the sloshing mixture of cargo and water, especially if the ship is loaded in alternate holds with high density cargoes (such as iron ore). If the bulkhead between one hold and the next collapses, progressive flooding could rapidly occur throughout the length of the ship and the vessel would sink in a matter of minutes.

IACS concluded that the most vulnerable areas are the bulkhead between numbers one and two holds at the forward end of the vessel and the double bottom of the ship at this location. During special surveys of ships, particular attention should be paid to these areas and, where necessary, reinforcements should be carried out.

The criteria and formulae used to assess whether a ship currently meets the new requirements, for example in terms of the thickness of the steel used for bulkhead structures, or whether reinforcement is necessary, are laid out in IMO standards adopted by the 1997 Conference.

Under Chapter XII, surveyors can take into account restrictions on the cargo carried in considering the need for, and the extent of, strengthening of the transverse watertight bulkhead or double bottom. When restrictions on cargoes are imposed, the bulk carrier should be permanently marked with a solid triangle on its side shell.

DECEMBER 2002 SOLAS AMENDMENTS RELATING TO BULK CARRIER SAFETY

The MSC at its 76th session in December 2002 adopted amendments to chapter XII (Additional Safety Measures for Bulk Carriers) of the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended to require the fitting of high level alarms and level monitoring systems on all bulk carriers, in order to detect water ingress.

The recommendation for the fitting of such alarms was first highlighted during the meeting of the Working Group on Bulk Carrier Safety held during the MSC's 74th session in December 2001, following on from recommendations of the United Kingdom Report of the re-opened formal investigation into the loss of the Derbyshire.

The new regulation XII/12 on Hold, ballast and dry space water level detectors will require the fitting of such alarms on all bulk carriers regardless of their date of construction. The requirement entered into force on I July 2004, under the tacit acceptance procedure.

In addition, a new regulation XII/13 on Availability of pumping systems requires the means for draining and pumping dry space bilges and ballast tanks any part of which is located forward of the collision bulkhead to be capable of being brought into operation from a readily accessible enclosed space.

A further regulation affecting bulk carriers was also adopted: access to spaces in cargo areas of oil tankers and bulk carriers. The new regulation II-1/3-6 in SOLAS chapter II-1 (Construction structure, subdivision and stability, machinery and electrical installations), Part B (Subdivision and stability), is intended to ensure that vessels can be properly inspected throughout their lifespan, by designing and building the ship to provide suitable means for access. Associated Technical provisions for means of access for inspections, also adopted, are mandatory under the new regulation.

DECEMBER 2004 - REVISED SOLAS CHAPTER XII ADOPTED

The MSC at its 79th session in December 2004 adopted a new text for SOLAS chapter XII (Additional safety measures for bulk carriers), incorporating revisions to some regulations and new requirements relating to double-side skin bulk carriers. The amendments entered into force on I July 2006.

The amendments include the addition of a new regulation 14 on restrictions from sailing with any hold empty and requirements for double-side skin construction as an optional alternative to single-side skin construction. The option of double-side skin construction will apply to new bulk carriers of 150m in length and over, carrying solid bulk cargoes having a density of 1,000kg/m³ and above.

The MSC also adopted mandatory



standards and criteria for side structures of bulk carriers of single-side skin construction and standards for owners' inspections and maintenance of bulk carrier hatch covers.

FREE-FALL LIFEBOATS ON BULK CARRIERS

The MSC at its 79th session in December 2004 adopted an amendment to regulation 31 in SOLAS chapter III (Life-saving appliances and arrangements) to make mandatory the carriage of free-fall lifeboats on bulk carriers.

RECENT DEVELOPMENTS

In June 2019, IMO adopted the consolidated edition of the International Maritime Solid Bulk Cargoes Code (IMSBC Code), incorporating amendment 05-19. The 2019 amendments include updates to various schedules, such as new individual schedule for BAUXITE FINES as a Group A cargo, as well as editorial amendments. The amendments are incorporated into a consolidated IMSBC Code, to include all amendments to date, since the IMSBC Code was first adopted in 2008. (Expected entry into force: I January 2021; be applied by amendments may

Governments, in whole, or in part, on a voluntary basis from I January 2020).

IMO MODEL COURSE ON SAFE HANDLING AND TRANSPORT OF SOLID BULK CARGOES VALIDATED

The safety of ships carrying bulk cargoes depends on proper implementation of IMO rules — and training is crucial. A new IMO Model Course on Safe Handling and Transport of Solid Bulk Cargoes is now available after it was validated by the IMO Sub-Committee on Carriage of Cargoes and Containers in September 2019.

The course will focus on the mandatory measures for handling and transport of solid bulk cargoes outlined in the International Maritime Solid Bulk Cargoes (IMSBC) Code, which is the industry rulebook on how to deal with such cargoes.

IMO model courses are designed to facilitate access to knowledge and skills.

The course will cover all solid bulk cargoes, including those which may liquefy when moisture limits are reached and cause instability of the ship. These cargoes require that particular attention is paid to testing and recording moisture limits before loading.

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A critical cog in calming the climate crisis

When it comes to addressing the world's most pressing challenges, it is increasingly clear that collective, coordinated, and global action is not only beneficial; it is essential, *writes Andreas Glud, Group Segment Manager, Marine, Dry Dock, Hempel A/S.* The threat of climate change is so dangerous precisely because its impacts are so broad and the contributing factors, in many instances, difficult to detect, measure and control. However, climate change is an existential threat which will impact on every nation, every business and every individual in many ways.

The driving force for responding to the challenge of climate change currently is the International Maritime Organization's (IMO) 'Initial Strategy on the Reduction of Greenhouse Gas Emissions from Ships', or 'Initial Strategy'. This outlines for the maritime industry — and suppliers of marine fuels — the "levels of ambition" set for vessel emissions in order to reduce emissions in line with the United Nation's Paris Climate Agreement.

These levels of ambition set a minimum target of reducing carbon (CO_2) emissions from ships by 50% by 2050 against the IMO's 2008 baselines, with a view to phasing out GHG emissions entirely — creating a zero-emission maritime industry. This is an extremely difficult, albeit necessary, goal. Unfortunately, as it stands now, there is no viable, scalable fuelling solution currently in existence. Achieving the 2050 target alone requires a reduction of emissions of 40% by 2030; which means zero emissions ships must be in service by 2030.

This is why Hempel, the worldwide coatings manufacturer, has joined the Getting to Zero Coalition.

The Coalition is a partnership between the Global Maritime Forum, Friends of Ocean Action and the World Economic Forum. It brings together stakeholders from the maritime, energy, infrastructure and finance sectors (supported by key governments and IGOs), with the main objective of introducing commercially viable deepsea zero-emissions vessels by 2030.

With the Coalition, there is now a co-ordinated effort to see commercially viable zero emissions vessels operating along deep-sea trade routes by 2030, and importantly, with cross-industry support, there is the momentum required to affect real change. Hempel is the only coatings manufacturer currently working with the Coalition.

To achieve the decarbonization goal, four areas of exploration have been identified by the Coalition: fuels, ships, market drivers and policies. The agreed timescale for delivery allows for solution development until 2023, followed by a test period until 2027, with preparations for roll-out occurring between 2028 and 2030.

The work of the Coalition is being supported by knowledge partners such as UCL Energy Institute, Environmental Defense Fund and the Energy Transitions Commission. Importantly, it is aligned with and involves Poseidon Principles — a global framework for climate-aligned ship financing — launched on 18 June 2019. This is critical, as the financing of energy efficient shipping solutions is a deciding factor for making the zero emissions future a reality.

While the Coalition is focused on the ultimate goal of developing zero emissions vessels and supporting infrastructure, the responsibility for lowering emissions currently primarily lies with ship owners, operators and managers. It is incumbent upon every player to contribute toward a cumulative emissions reduction effort. As many savvy shipowners know, achieving tangible efficiency savings requires a combination of design improvements and operational changes. Applying a hull coating that reduces fuel usage is a common strategy that has proven returns.

To help shipowners and operators meet and measure emissions reductions against new efficiency and environmental targets, we need to understand the performance of





the ship's hull. Hard data and analysis play an important role here. This is why Hempel offers a more holistic approach to its customers and has its own hull performance system SHAPE (Systems for Hull and Propeller Efficiency).

SHAPE is founded on the International Organization for Standardization (ISO) SHAPE combines 19030 framework. elements of hull and propeller efficiency optimization to maximize the quality of performance data analysis. The system uses in-service performance KPIs to track long term trends that generate important data for fact-based decisions. This offers a whole new level of fuel efficiency intelligence. Using the performance data, Hempel can then provide customers with tailored solutions, enabling every ship operator to maximize their hull efficiency and calculate return on investment.

Utilizing data intelligence and applying tried-and-tested methods for improving vessel efficiency and performance, which

can be measured, calculated and controlled provides proof of efforts made by shipping companies to reduce their emissions. This intelligence is crucial to understanding how the industry is delivering on its responsibilities, while enhancing their own operations.

As the maritime and energy industries work on developing future fuelling solutions that will eliminate carbon emissions and shape the world of shipping for generations to come, investing in technologies that enhance performance and reduce fuel requirements is a significant step in the right direction. As we are all learning, responding to existential threats that impact every aspect of life in the way that climate change inevitably will if we carry on as we are now, requires a coordinated effort, drastic changes, and for everyone to do their bit for the greater good.

HIPPING & TRANSPORT

A sound hull is integral to keeping safe at sea

The safety of dry cargo ships, bulk carriers in particular, depends, among other things, on their hull structural integrity. "It is commonly recognized that a vessel itself is the best life-saving appliance for its crew," said Dariusz Rudziński, from the Polish Register of Shipping (PRS) Management Board. "Intact vessel protects carried cargo and poses no threat to the marine environment," he added. Therefore, for many years now, regulators have zeroed in on the issue of hull structural integrity, hull strength and hull structural members fatigue. The Goal Based Standards (GBS) approach in relation to hull strength of bulk carriers and oil tankers, introduced into the SOLAS Convention several years ago, can serve as an example of the above Classification societies aspiration. associated in IACS have developed Common Structural Rules for bulk carriers and oil tankers (CSR), which were verified by IMO and found compliant with GBS.

The CSR Rules gather and unify the state of the art class standards, which, apart from knowledge, require from every class society specialized software. This sophisticated software performs verification of strength and fatigue calculations required by the rules. Having their rules verified against GBS provisions, class societies decided on periodical verification of their software and accordingly, in 2018, established a relevant working group. Last year, the Group positively completed the extensive works on the verification of strength calculations results for conformity with Common Structural Rules for bulk carriers and oil tankers, known also as the cross-checking exercise.

"For Polish Register of Shipping, the participation in the works of this Group has been an important step to systematize and verify knowledge and calculation instruments and procedures for strength analysis of this type of structure," said Dr Monika Warmowska-Gadzińska, PRS director for Research and Development. "It has been a special challenge for PRS, as we started our participation in CSR verification works for the first time," Warmowska-Gadzińska added.

For many years, PRS R&D Division has developed such software in co-operation with the company's Ship Division. Positive verification of results within cross-checking works guarantees that PRS is prepared to provide classification supervision over bulk carriers and oil tankers built to GBS novel requirements. PRS plans to further develop its software, while advancing and continuously updating its rules.

Except for structural aspects, operational issues are also of vital importance for the safety of life at sea. PRS gives special consideration to such issues as, inter alia, fumigation operations of cargo holds, which can pose a threat to the crew's health and in the worst case scenario cause a loss of life.

PRS investigation into the case on board a multi-purpose vessel revealed that as a result of air contamination in an accommodation superstructure by the fumigant used in the ship's cargo hold the whole crew was poisoned and two crew members lost their lives.

PRS survey that followed identified the cause of air contamination in the superstructure, namely a thorough corrosion of a steel wall forming a joint part of superstructure air conditioning and cargo hold ventilation ducts. An air conditioning system while at work sucked fumigant from a sealed cargo hold through a corroded steel duct wall, which led to the distribution of the polluted air throughout the entire superstructure.

"It must be noted that the corrosion occurred in the area which, according to the class rules, was not subject to survey, i.e. there was no obligation to examine ventilation ducts from the inside", said Grzegorz Pettke, , PRS director for Shipping Division.

Following the investigation into the accident that took place in 2015, PRS decided to amend its Rules for the Classification and Construction of Seagoing Ships referring to the ventilation of cargo spaces to read:

"Ventilation of Cargo Spaces: Considering the fumigation operation of cargo holds, ventilation ducts shall not have shared structural elements (e.g. common divisions) with ventilation ducts running to any other ships spaces, such as crew spaces, machinery spaces and other working spaces as defined by IMO in paragraph 3.3.2.3 of MSC.1/Circ.1264, the Recommendations on the Safe Use of Pesticides in Ships Applicable to the Fumigation of Cargo Holds, as amended."

In addition, for existing ships, where applicable, it is recommended to carry out a close-up examination of the common boundary between cargo hold and accommodation ventilation duct at every class renewal and intermediate survey.

"In accordance with the ISM Code, ship operators are reminded about the necessity to perform a risk analysis associated with the fumigation operation of cargo holds," Pettke added.



Anticipating technical faults with machine learning

Failures in critical onboard machinery can result in production loss, delays, or even worse, endanger the ship and its crew, write Morten Stakkeland, Data Scientist, ABB Marine & Ports; and Bo Won Lee, Product Manager, Propulsion Control Unit, ABB Marine & Ports.

For the past decade, ABB Ability[™] Marine Remote Diagnostic Systems have been collecting data to provide technical support when needed, as well as timebased reports related to the status and operation onboard the vessel. With the volume of data collected, owners are able to augment onboard crews' skills and increase the efficiency of fleetwide operations adding value on a daily basis.

The Advance Analytics team in Smart Asset Management is able to support and help key marine players to make the correct decisions based on data by analysing the vast amount of information collected over the years and applying machine learning applications. Another key application from the results provided by the Advance Analytics team is that ABB products and digital solutions can be improved and optimized to provide additional value by adjusting and enhancing current designs, for example thermal protection used on the Propulsion Control Unit application in ABB Ability[™] System 800×A.

The recently developed prediction model has a representation of the motor cooling unit independent from the PT100 motor winding temperature measurements. All the required data for the model is collected by RDS from the frequency converter (actual power and actual torque signals) and the propulsion motor cooling system (cooling air temperature signal). The prediction model is coded in PCU controller application and can calculate the 'predicted motor winding temperature'.

The predicted motor winding temperature is used so that average winding temperature is compared with the model temperature for all the range of motor temperature, and notify the alarm system or reduce the propulsion power if the condition persists.

This prediction model can be configured and extended to other heavy machinery applications, including propulsion transformer or diesel generator.

THE APPLICATION

The scope of the work was to develop a thermal protection function for high performance marine propulsion motors. A generic overview of the system can be



found in Figure I. This specific generic configuration is frequently used in marine propulsion systems where an onboard freshwater cooling system is used to remove heat produced by the propulsion motor. The motor is cooled by an air cooling loop, where air is circulated by one or more fans. Heat is transferred from the hot air to the fresh water cooling system in a heat exchanger.

The temperature of the air is measured on the inlet and outlet of the heat exchanger. The rotation speed of the motor is either measured directly or provided by the Propulsion Control Unit (PCU). The Propulsion Control Unit (PCU) is a controller application integrated with the propulsion frequency converter that controls the speed and power of the propulsion motors. The mechanical torque and electrical power are calculated and provided by the PCU. More instrumentation may be available on some vessels, but a minimum set was chosen for training.

Until now, all the propulsion winding temperature protections have been based on physically mounted PT100 temperature sensors on the motors. There is a fixed limit (typically at 155° C) in the propulsion control software that enables only single point of critical temperature level protection, and this does not cover the entire range of temperature below the critical set point. Based on the mounting spot of the PT100 sensors, efficiency and accuracy of the protection system may vary - the highest temperature of windings may be on a different spot on the area.

The main target of the development work was to implement a thermal protection function that can detect an abnormal state prior to reaching the HH temperature limit, as past experience shows that the motor may already be damaged when this temperature is reached. Given the critical function of the class of high performance marine propulsion motors under consideration here, the ability to detect failures at an early stage adds value for the customers.

THE PEOPLE

The effort to develop the thermal protection function involved people from several sections within ABB Marine, but also co-operation with external academic partners through the Big Insight project, where ABB is a funding industrial partner. ABB contributes in the Sensors Systems work package, selecting research tasks, providing data, and actively contributing in the work. Morten Stakkeland is employed part-time in the department of Statistics at the University of Oslo as Associate Professor II, while Jaroslaw Nowak has started working on an industrial PhD in close cooperation with the project.

The bulk of development work within ABB has been performed by the analytics team in the Marine Digital Service department. The main function of the team is to extract knowledge from the existing pool of past data collected by RDS and other sources, and develop the digital functions that will be sold to customers in the future. Nowak had a key function in the early stage of the project, delivering problem definition, signal selection and establishing a data pipeline, while Stakkeland has supported most of the cross-team academic work. In this project, researchers from the Norwegian Computing Center provided support with statistical analysis.

The implementation and adaptation of

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the developed algorithms to the PCU platform has been led and carried out by Bo-Won Lee from the Technology department.

THE DATA

All data has been collected by the ABB Ability[™] Marine Remote Diagnostic System (RDS). For all the propulsion motors in the dataset, the following measurements were collected:

- air temperature on both sides of the heat exchanger;
- mechanical torque;
- speed;
- power; and
- redundant temperature measurements on each winding.

Two datasets were collected, from two separate classes of vessels and propulsion motors. The first dataset consisted of data from two vessels with two propulsion motors on each vessel, and the duration of the dataset was approximately one year. The second dataset consisted of data from five individual vessels, with durations varying from two months to two years. One of the datasets also included data from sea trials.

The RDS was configured to collect data every minute synchronously, which means that each signal collected was approximately once per minute independent of the signal state. Note that the sampling times of each signal do not necessarily correspond to the sampling times of the other signals. In addition, socalled asynchronous loggers were configured to sample data if a signal changed more than the configurable limit. These loggers hence sample data at irregular intervals, more frequently during periods with high dynamics. An illustration of how the synchronous and asynchronous samplers interact is given in the following figure. A sync sampler is here configured to sample every 100s, while an async sampler stores a timestamped value if the signal changes more than d=20 in this case.

In the final PCU application, the signals are sampled at regular and fixed intervals, with sub-second sampling intervals. In Figure 2: The ability to detect abnormal heat generation in the motor below the HH limit is facilitated through modeling the generic system.



order to deal with the irregularly sampled data obtained from the RDS, missing data and other artifacts, the training data was resampled at a regular grid of one minute using interpolation. The interpolation was implemented using last observation carrier forward, often called zero-order hold (ZOH), and linear interpolation. This resampling and data preprocessing step is a necessary part in analytic and machine learning applications, where data are sampled at differing and irregular intervals. The optimal re-sampling strategies will vary between applications, dependent on the configuration of the async and sync samplers.

THE MODELLING

The ability to detect abnormal heat generation in the motor below the HH limit is facilitated through modelling the generic system in Figure 2. However, rather than using a classical engineering approach by modelling the cooling loop using a system of differential equations or the equivalent, a data-driven approach was applied. Past data together with machine learning and statistical modelling was used to derive the relationship between system inputs and outputs (winding temperatures). The derived model is then used to detect deviations from the normal case — in this case overheating.

Using data-driven modelling and



machine learning offers several potential benefits. Firstly, a data driven model is not dependent on specific domain or application knowledge, like the ability to model the heat transfer within the propulsion motor itself. A model can thus be created without access to experts possessing this knowledge, internally or externally. Secondly, a data-driven model has the potential to capture effects or correlations that are unknown to the experts creating a physics-based model. It is to some extent less dependent on prior knowledge, but on the other hand these effects need to be captured in the training data.

The training data is limited in the sense that data from failure cases is scarce at best. Using an out-of-the-box machine learning algorithm to train a classifier algorithm that can separate faults from non-faults is hence difficult or impossible. This is a general challenge in marine applications, as well-tagged failure data is rarely available. One reason is, of course, that some failures are rare by nature, but exchange of data between companies is also rare, and there is a widespread lack of correctly identified and labelled fault data. The chosen approach in this work was thus to model the system using regression analysis, and to use knowledge and physicsbased modelling of fault effects.

As the final protection function is to be implemented in the PCU, the complexity of the model and the memory requirements need to be adapted to the real time requirements of the final application. The flow is shown in Figure 3, left.

EXPONENTIALLY WEIGHTED MOVING AVERAGE (EWMA) MODELS

Considering the physics of the considered system, the temperature of the windings

Parameter	Description	Units		
t _{in}	Cooling air inlet temperature at time k	Degrees Celsius		
tout	Cooling air outlet temperature at time k	Degrees Celsius		
Р	Power at time k	% of max power		
P^2	Power squared at time k	(% of max power)^2		
P_{lag}^2	Lagged squared power calculated recursively using squared power as input variable, and a given time con- stant	(% of max power)^2		
Т	Absolute value of Torque at time k	% of max Torque		
T _{lag}	Lagged torque calculated recursively using absolute value of torque as input variable, and a given time constant	% of max Torque t		
T ²	Torque squared at time k	(% of max Torque)^2		
T_{lag}^2	Lagged squared torque calculated recursively using squared torque as input variable, and a given time con- stant	(% of max Torque)^2		
P · T	Absolute value of power multiplied by absolute value of torque	(% of max power) * (% of max Torque)		

TABLE 1

cannot be modelled by the instantaneous inputs. The history of the system needs to be taken into account. Heating up a block of metal takes some time, even when running at full power.

EWMA models were used to take past system values into account. An EWMA model can be characterized by the following equation.

 $y_k = 1 - \theta \cdot y_{k-1} + \theta \cdot x_k$

 y_k here is the output of the EWMA model at time step k, y_{k-l} is the value of the EWMA at the previous time step, and x_k is the input variable. θ is a design variable, which determines the time constant of the system. The relationship between the factor θ , time constant T, and sampling interval Δ is given by:

 $\theta = \frac{2}{4+\tau}$. The EWMA model is in practice a first order low pass filter with time constant T. The EWMA models have several benefits, the first being the recursive nature of the models, which requires little memory and is relatively

simple to implement in an industrial real time system. Also, a system that can be characterized by a first order ordinary differential equation can be perfectly approximated by an EWMA model. The model is hence a decent approximation for many physical systems, including heat transfer models.

THE TRAINING

The model was trained using regression analysis, fitting a model to the data. An overview of the workflow can be seen in Figure 4 on p30. A number of different models were tested, including different combinations of inputs and EWMA models with different time constants.

The performance of the monitors was evaluated using a measure of accuracy called the Root Mean Square Error (RMSE), which is given by the following equation.

$$RMSE = \sqrt{\sum (t_p - t)^2}$$

Note that in the final application, we are not very concerned with the RMSE, but rather with the following parameters:

- the false alarm rate;
- the probability of missed detection given a fault; and
- the time to detection given a fault

The RMSE is still a useful measure of the accuracy of the model, even though the three parameters also depend on other statistical properties of the model residual.

Several similar models and parameter combinations were shown to provide similar accuracy in the sense of RMSE. However, the following model was selected based on the following criteria:

- minimize the number of variables; and
- use physical knowledge where available
 know that the heat generation is a function of torque squared.

The selected model is given by the equation at the bottom of pxx, where the inputs are described in the Table I above. A lagged variable here means that the variable

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is used as input to a EWMA model.

Note that the structure of the model is relatively simple, and only the values of the EWMA models at the previous time steps are stored in memory. This means that the model and monitor can be implemented without requiring significant computational power or memory.

An example of comparison between the predicted and actual temperatures on a motor, with data recorded during sea trial, is shown in Figure 5.

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The plot shows how the prediction is close to the winding temperatures, with an error smaller than 10° Kelvin. The data and corresponding estimates are from a sea trial, from a motor that was not included in the training data.

In the verification phase, leave-ship-out and leave-motor-out where used to verify that the model was not overfitted to the training data. When running a leavemotor-out analysis, a

single motor was left out of the training data when estimating the parameters of the model. The model was then tested on the left-out motor, to check the degree of fit. In addition to leave-ship and leave-motorout analyses, a new dataset will be collected from a new vessel and used as a verification dataset

THE MONITOR

Based on the implemented model, a monitor was deployed using a simple threshold. If the actual minus exceed the threshold of predicted temperatures, then protection functions were initiated.

The monitor was implemented with one monitor and one set of parameters per motor class, without adapting a single model and monitor to each individual vessel or motor. With this approach, no additional training data is needed for new vessels. However, long time monitoring of new data is expected to be implemented in Azure.

Note that an integrating counter was implemented in order to deal with outliers of short duration in the data.

The monitor should be disabled during periods of zero power. If the fans in the air cooling loop are turned off, then the motor

 $+ \alpha_0 \cdot P \cdot T$





will take on ambient temperature, which in rare cases may trigger the monitor if active.

RESULT

The threshold of the monitor could be set such that no single false alarms were generated in the training data. Based on this threshold and a realistic failure model, the monitor can be shown to detect failures more than one hour before the critical trip limit is reached, and at temperatures significantly below the high temperature trip limit.

CURRENT STATUS

As mentioned in a previous section, a monitor has been trained for two classes of vessels. A monitor with an integrating detection function has been implemented in the PCU, and tested in an on-shore simulation. The model and monitor has been implemented in the PCU on a vessel that is currently on its way to sea trial. The monitor is implemented in a test mode, in the sense that no safety functions are activated. It is going to be in test mode during a validation period, where the performance of the model is monitored in the actual setting, and a validation dataset is collected. During the validation period, the

RDS is logging both the inputs and the output of the model and monitor at high temporal resolution.

FUTURE WORK

On the research side. some effort is expected to be put in to developing individual models for each motor, and to investigate how prior data collected from other motors and vessels, can be used to train the model using a minimal amount of data. Also, further developing generic fault models based

on faults from similar motors will also be investigated.

On the implementation side, focus will be on building automatically update digital twin models in Azure. The digital twin implementation allows for different metrics and analytics to be implemented on the dataset, as for instance long term monitoring of the model.

Also, some additional parameters should be included in the modelling where available, as for instance the cooling water temperature and the number of running cooling fans and their respective speeds. Adding instrumentation to new constructions to improve the model should also be considered.

In addition, the regression modelling will be extended and adapted to other systems.

CONCLUSIONS

Data collected by the RDS has been used to apply machine learning to develop a motor temperature monitor. The monitor can detect faults way before existing safety functions. Machine learning and statistical modelling are powerful tools for developing equipment models; digital twin models that simulate the normal function of a local system or piece of equipment.

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Safe Bulkers extends partnership with Alfa Laval through a PureSOx Service Agreement including connectivity

In June 2018, Greek dry bulk operator Safe Bulkers selected Alfa Laval to retrofit 20 of its vessels with Alfa Laval PureSOx scrubber systems for exhaust gas cleaning. The company has now gone on to sign a long-term Alfa Laval Service Agreement, which will safeguard compliance through connectivity and more.

Safe Bulkers ordered PureSOx retrofits for 12 Post-Panamax vessels, six Kamsarmax vessels and two Capesize vessels, with deliveries running until March 2020. Almost 15 of those systems, which comprise open-loop scrubbers configured for multiple inlet sources, have now been installed at COSCO retrofit yards with engineering design of Alpha Marine Consulting P.C. Throughout the process, Alfa Laval has partnered closely with the yards, providing support through locally based project managers with strong backing from PureSOx product centre in Nijmegen, Netherlands.

"Alfa Laval's project management has really been first-rate," says Dr. Loukas Barmparis, President of Safe Bulkers. "Not only was there no time difference or language barrier in working with our yards, there was never any question about scope or responsibilities. Alfa Laval's team worked with us proactively to solve issues as quickly as possible, and they brought additional resources to the yard whenever time or flexibility became a concern."

TAKING THE CO-OPERATION FURTHER

With the majority of the PureSOx retrofits completed, Safe Bulkers is now looking ahead to secure trouble-free operation. Recently, the company signed a tailored Alfa Laval Service Agreement that will deepen the partnership between the two companies. The agreement includes connectivity and lifecycle-oriented services selected from the Alfa Laval PureSOx 360° Service Portfolio, provided for a flat yearly fee.

"We feel very satisfied with the scrubber project execution, and we want to be equally successful in the operation of our PureSOx systems," says Barmparis. "The Alfa Laval Service Agreement will help us safeguard long-term performance, for example by using data analysis to keep



systems performing at their peak."

SERVICES TO SAFEGUARD PERFORMANCE OVER TIME

Safe Bulkers' forward-thinking ambitions are reflected in the scope of the Service Agreement. In addition to genuine Alfa Laval

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"Hands-on training will lay a foundation for safe, compliant and cost-effective PureSOx operation," says Barmparis. Safe Bulkers crew members and superintendents will be trained at the recently opened Alfa Laval PureSOx Training Centre in Shanghai, China, where a full-size PureSOx system is installed. "On top of that foundation, we will use datadriven PureSOx Connect services for compliance and performance monitoring."

PureSOx Connect services will let Safe Bulkers prove compliance easily, generating automatic reports for handover to local



Alfa Laval PureSOx Exhaust Gas Cleaning System. enabling health monitoring, root-cause identification and remote service support when needed. "Scrubber connectivity will give us deeper insights and keep our systems

deeper insights and keep our systems optimized," says Barmparis. "Alfa Laval will perform yearly Condition Audits of our PureSOx installations, but PureSOx Connect will help us take preventive actions and minimize the corrective needs they find."

authorities. In addition, the scrubber data

will be analysed with advanced algorithms,

PARTNERSHIP FOR LONG-TERM COMPLIANCE

"We want to protect our uptime and eliminate any risk of non-compliance," says Barmparis in summary. "Alfa Laval was the natural choice to help us do that, and their clear service offering made it easy to find the right services for our needs."

René Diks, Director for Exhaust Gas Cleaning at Alfa Laval, is pleased to see the cooperation between Alfa Laval and Safe Bulkers being taken to the next level and further strengthened.

"As in all projects, we've worked hard to meet Safe Bulkers' expectations during the sales and order execution phases," Diks says. "Now that the orders are nearing completion, we will continue working hard to provide Safe Bulkers with support and services that will keep their PureSOx systems compliant and in top shape. More than scrubber deliveries, we see this as a long-term partnership."

ABOUT ALFA LAVAL

Alfa Laval is a major global provider of specialized products and engineering solutions based on its key technologies of heat transfer, separation and fluid handling.

The company's equipment, systems and services are dedicated to assisting customers in optimizing the performance of their processes. The solutions help to heat, cool, separate and transport products in industries that produce food and beverages, chemicals and petrochemicals, pharmaceuticals, starch, sugar and ethanol.

Alfa Laval's products are also used in power plants, aboard ships, in oil and gas exploration, in the mechanical engineering industry, in the mining industry and for wastewater treatment, as well as for comfort climate and refrigeration applications.

Alfa Laval's worldwide organization works closely with customers in nearly 100 countries to help them stay ahead in the global arena. The company has about 17,200 employees. DC:

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Mejillones records record year for dry bulk

In Chile, the Mejillones Port Complex (CPM), which is situated on the country's northern coast, handled a record 6.7mt (million tonnes) in 2019, which was 5% higher than in 2018.

Much of the growth was driven by bulk copper traffic, which amounted to 1.1 mt on the year. A total of 389 vessel calls were logged.

According to managing director Álvaro

Arroyo, this growth in traffic is a reflection of the growing importance of the Complex's mineral handling activities. In addition, it shows that Mejillones is now a genuine alternative for Pacific coast traffic, especially given its all-year-round calm waters.

Another advantage is that the port is linked directly to the regional road network, obviating the need for HGVs to pass through the local urban centre.

Key to its success has also been the fact that CPM is managed as a subsidiary of the national copper company, Codelco. Indeed, the two privately-operated terminals that form the Complex are located on Codelco-owned land. These are Puerto Angamos, which handles general cargo, and TGN, which specializes in dry bulk handling. Barry Cross

Mussalo Bulk Terminal to benefit from major investment package

Rauanheimo and the Port of HaminaKotka Ltd have agreed on an investment package encompassing the expansion of Finland's Mussalo Bulk Terminal.

As part of the agreement, Rauanheimo is both to invest in a new rail wagon unloading terminal and build new rail sidings to serve the terminal. These will be built in co-operation with Port of HaminaKotka Ltd.

Rauanheimo says that the investment will help strengthen Mussalo terminal's dominant position in the handling of those dry bulk products that require covered storage.

The investment, which will be in place by the summer, will involve spending €17 million in both handling equipment and warehouses at Mussalo. Of the former, there will be new conveyor systems, cranes and wheel loaders, along with a 30,000 square metre bulk warehouse. Furthermore, the M-I, M-3, M-4 and M-5 warehouses are being divided into separate departments to enable the simultaneous storage of more than 100,000 tonnes of various commodities.

As part of the upgrade, Rauanheimo will increase the overall annual capacity of the Mussalo Bulk Terminal. This will be done in phases, with the intention of boosting the current 1mt (million tonnes) capacity to 3mt. However, to make this possible, the rail sidings and wagon unloading station will first have to come fully on line.

As part of Rauanheimo's remit, it provides services at five warehouses, including everything from rail wagon unloading operations to the loading of docked vessels. The company is already Finland's leading port operator not to mention the biggest operator of transit traffic in the country, where it handles a lot of Russian traffic. Its client portfolio includes the main players in the mining, wood processing and metal industries in Finland.

To date, Rauanheimo operates at seven Finnish ports, making it the biggest dry bulk operator in the country. Barry Cross

India to increase imports of coking coal from US and Russia

India, which has reported a shortage of coking coal used for the production of steel, has announced that it is to increase the imports of this commodity from the United States, in a move which could deepen Indian-US bilateral energy partnership.

India's Steel and Petroleum Minister Dharmendra Pradhan recently noted, "We are having policy-level business and long-term interactions for engagement with the US for sourcing coking coal."

In the meantime, the Indian government is planning to raise domestic steel output from the current level of 140mt (million tonnes) to 300mt by 2030. This will boost the need for coking coal by 190% to 175mt. In the last three years, American oil supplies to India have also jumped ten-fold to 250,000 barrels per day as of 2017.

Previously, India had also had

talks with Russia, also aimed at boosting imports of metallurgical or coking coal as a means of reducing its dependency on a small group of core countries from which it sourced this.

Dharmendra Pradhan, for example, had

earlier met with Leonid Petukov, CEO, Far East Russia Investment and Export Agency, to discuss further developing economic links with the Russian Far East, specifically with boosting coking coal imports in mind. Barry Cross



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RON ORE

Duluth Seaway Port Authority awarded \$10.5 million MARAD grant for warehouse expansion, dock wall rehab

In February, Minnesota Congressman Pete Stauber announced that the United States Department of Transportation's Maritime Administration allocated a \$10.5 million grant to the Duluth Seaway Port Authority.

This Port Infrastructure Development Program grant will help fund construction of a 56,000ft², rail-served warehouse at the Clure Public Marine Terminal, along with rehabilitation of 1,775 lineal feet of deteriorating dock walls at Berth 10 and 11 of the Clure Terminal Expansion.

The new warehouse will build upon an existing 430,000 ft² of warehouse space at the Clure Terminal in high demand by regional businesses.

The dock wall rehabilitation will fortify seven acres of laydown space for inbound and outbound heavy-lift cargo and also protect the recently renovated dock deck.

These improvements will provide even greater supply chain cost savings to regional industries, helping keep them competitive in the global marketplace. This infrastructure upgrade will also allow increased cargo storage and movement flexibility which, within the context of shipping logistics and supply chain management, allows cargo owners to take greater advantage of market opportunities.

"We are incredibly excited by the award of the PIDP grant and we thank Congressman Stauber and Senators Amy Klobuchar and Tina Smith for their support in this endeavour," said Deb DeLuca, executive director of the Duluth Seaway Port Authority. "This grant supports projects that improve and broaden the infrastructure of the Clure Public Marine Terminal and the value it provides. These projects will also allow us to expand our service capabilities at our multimodal logistics hub, which in turn helps us support industries throughout the Upper Midwest."

ABOUT THE DULUTH SEAWAY PORT AUTHORITY

The Duluth Seaway Port Authority is a public agency created by state statute in 1955 to expand and improve facilities at the Port of Duluth-Superior. The Duluth Seaway Port Authority owns and maintains the Clure Public Marine Terminal, which is the Port of Duluth-Superior's only general cargo terminal.

Approximately 800 vessels and 35 million short tonnes of cargo move through the Port of Duluth-Superior each year, making it the Great Lakes' largest tonnage port and one of the nation's top 20. The port supports 8,000 jobs and contributes \$1.4 billion in business revenue to the regional economy.



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La Coruña expands terminals in its Outer Harbour

In north-eastern Spain, the mainly dry bulk port of La Coruña is to go ahead with expansion of terminals in its Outer Harbour area of Punta Langosteira. The port's board of directors has approved concessions extensions requested by both Maritime Terminals of Galicia (TMGA) and Oleosilos de Galicia.

To strengthen its presence in Punta Langosteira, TNGA is to build an additional two warehouses and an auxiliary linking road. This will require an area of 12,884m² and involve investment of €4.28 million. At present, it has two concessions in the Outer Harbour, totalling 30,000m², where mostly dry bulk and general cargo is handled. With the new concession area added, its operating area increases to 43,000m², encompassing loading, unloading and

storage operations.

As for Oleosilos de Galicia, this has been granted permission to expand both the capacity and current operating area in Punta Langosteira. Henceforth, it will have $13,860m^3$ of storage, which will be used to import various commodities. Its planned investment therefore increases from $\in 1.4$ million to $\in 4.3$ million.

Barry Cross

The emergency situation has not brought about any significant changes in cargo handling at the Port of Riga

Since the state of emergency was declared in Latvia, due to the Covid-19 crisis, as of late March, the port had still been able to provide all due services to 119 vessels, which have called the Port of Riga, with a total of 908,000 tonnes of various cargoes handled.

Cargo flows are transported both by sea and by road, i.e. by trucks and rail wagons — 20,300 road transport units and 6,300 railway wagon units have been used for reception and delivery of cargo at the Port of Riga since March 13.

"This is a complicated time all over the world. In today's crisis we are more than ever aware of the importance of having such a transport hub like the Port of Riga. Our priority right now is to maintain a constant and uninterrupted port operation, of course, with all security measures in place to maximize the protection of port workers from Covid-19. The port is working and we are constantly monitoring the situation in the cargo segment in order to be able to respond to the trends that may arise due to various restrictions, implemented in the world, and if necessary be able to adapt the financial plans of the Freeport Authority to the new circumstances", says Ansis Zeltins, the Freeport of Riga CEO.

At the same time, in spite of the current challenges in the sector, a new type of cargo has arrived at the Port of Riga this month — since March, the "KS Terminal" has started transshipment of bulk cement. On March 26, the specialized vessel Greenland with bulk cement cargo has called the Port of Riga for the second time. Due to closed automated handling equipment on board, the bulk cement is handled in an environmentally safe mode, preventing dust from entering the environment. In addition, the ship is powered by liquefied natural gas (LNG), which makes it even more environmentally friendly.

Greenland, carrying an average of 3,500 tonnes of cement, will call the Port of Riga regularly, two to three times a month. Despite the crisis caused by Covid-19, for the time being, the arrival of the vessels is proceeding as planned and we have not received any news of changes. As for the other types of cargo — "KS Terminal" currently operates in normal mode and everything is being implemented in compliance with the agreed plans. However, we shall take into consideration the fact, that the situation can change at any moment," comments Eriks Ceseiko, Chairman of the "KS Terminal" Board.

The Freeport of Riga is the largest port in Latvia and the second largest port in the Baltic States, handling 22% of the total cargo volume of the major Baltic ports in 2019. Approximately 200 private merchants operate at the Freeport, including 35 stevedoring companies freight terminals, which together provide around 5,000 jobs.

"According to our plans the LNG vessel

North Sea Port remains fully operational

North Sea Port is still fully operational in these coronavirus times. Thanks to various additional actions and measures, activities are continuing in a safe manner. The impact is being felt by individual businesses.

Day after day, the Dutch and Belgian governments are tightening measures to prevent the further spread of the coronavirus. North Sea Port is following these measures closely. At the same time, North Sea Port continues to focus on keeping the cross-border port operational along the Ghent side in Belgium and the Zeeland side in the Netherlands. The port is taking further actions and measures so that this can be done safely.

As a port, North Sea Port is still fully operational in the nautical sphere, with ships still entering and leaving the port smoothly and safely. The port authority is constantly monitoring whether the nautical services (from pilots, through lock operators and tug services to traffic controllers and the loading and unloading of ships) are still fully available in order to allow the work in the port to continue.

To date, North Sea Port has not seen a significant decrease in shipping movements in the port.

The port authority is receiving frequent questions about hygiene, distance between individuals and personal protective equipment. North Sea Port calls on everyone to adhere to the applicable national rules and to use their common sense.

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Baltic bulletin

bulk developments in Baltic ports



The Port of Fredericia – the European dry bulk hub in Denmark

Due to its strategically strong location in Denmark, the Port of Fredericia is an attractive hub for dry bulk activities in Denmark and Northern Europe. Situated in the middle of Denmark — and with easy access to European and overseas markets — large international companies within the dry bulk industry have consolidated their businesses at the Port of Fredericia as a central hub for their dry bulk operations.

The amount of dry bulk operations at the Port of Fredericia is growing. To secure constant development, large investments are made to ensure sufficient capacity and modern large-scale facilities for national and international customers. Due to the green transition, the demand for bioproducts is growing and, at the Port of Fredericia, the investments will continue. During the next two years, an additional five large warehouses will be established and equipped for organic and sustainable products.

OPTIMAL CONDITIONS FOR DRY BULK OPERATIONS

The Port of Fredericia is one of Denmark's largest deep-sea ports with storage and

warehouse facilities for more than 200,000 tonnes of dry bulk products at a time, leading to an annual throughput of more than 1,000,000 tonnes. The facilities are located close to the quays, making loading and discharging of products easy and flexible.

Large turning areas and a water depth of 15 metres ensure the best possible conditions for very large bulk vessels calling the Port of Fredericia.

INVESTMENTS TO ACCOMMODATE FUTURE DEMAND

Last year, the shipping stevedoring and Fredericia company Shipping A/S and its partner Copenhagen Merchants invested approximately €14 million in a new silo facility at the Port of Fredericia, adding modern storage capacity of 40,000 tonnes to the present facilities. With a total



capacity of 200,000 tonnes in warehouse and storage for dry bulk products, ADP and partners at the port co-operate to ensure the best possible solutions for customers within the dry bulk industry.

CEO of Fredericia Shipping A/S, Klaus G. Andersen, states: "With the new silo plant, we improve the port storage capacities to meet the increasing amounts of dry bulk expected in the future. We have already seen the effect of our large investment, giving us an advantage in a competitive bulk market".

Port of Roenne creates growth in the Baltics

Sea transport is the backbone for transportation of any type of goods and, for an island, sea transport is even more vital. This is why Port of Roenne everyday strives to serve the island of Bornholm, located in the middle of the Baltic Sea, as good as possible.

On an annual basis more than 1.5mt (million tonnes) of goods passes through the port, the majority of which is bulk goods, and the remainder are ro-ro cargoes.

One might assume that, as a small island with only 40,000 inhabitants, Bornholm's cargoes would principally be imports. However, a thriving local business community with agriculture and production of raw materials means that almost half of the bulk goods are exports. Therefore, the port hosts both a grain terminal and facilities for loading of raw materials like sand and gravel. Furthermore, an oil terminal with two operators provides diesel and petrol for cars and trucks on the island and MGO for visiting ships.

"At Port of Roenne we support the bulk business by providing attractive areas for production and storage as well as other regular port services like crane service, bunkering and waste disposal," says Maja F.



Bendtsen, Chief Business Officer - Bulk.

Another facility offered at Port of Roenne is the provision of high-speed WiFi. While this might seem trivial, it is a huge bonus for the entire crew of a visiting ship to be able to use it to contact families and loved ones back at home, using a strong and reliable connection.

Most importantly, Port of Roenne is investing heavily in preparing the port for the future. In summer 2019, the port inaugurated an expansion with a $150,000m^2$ multipurpose area, 275m and 300m quays and 11m water depth.

"The expansion is built to accommodate a fleet of increasingly bigger ships, which reduce the unit cost of bulk transportation and in the end will make production on the island more profitable," says Bendtsen.

Port infrastructure has long lifetimes, so the expansion is made in accordance with the 9th UN Global Goal for Industry, Innovation and Infrastructure and built to be resilient to both future increased water levels and stronger winds.

In the coming year the port will continue to develop and expand, making room for even more bulk business.



handling of dry and liquid bulk cargo and storage services Gdynia, Poland, www.hesinternational.eu

Rauanheimo continues investing in dry bulk handling in Finnish ports



Oy M. Rauanheimo Ab operates as a stevedoring, ship clearance and forwarding company at the ports of Kokkola, Oulu, Tahkoluoto (Pori), Koverhar (Hanko), Vuosaari (Helsinki) and HaminaKotka.

Founded in 1884, Rauanheimo has gained thorough knowledge of stevedoring, forwarding and shipping activities over the years and is today Finland's foremost port operator in dry bulk handling and Russian transit services. Rauanheimo has been operating at the port of Kokkola since its foundation 136 years ago and that is still the main port where the head office is situated. The company employs about 200 workers and has an estimated turnover of \in 130 million year 2020. The total annual volume is estimated to exceed 10mt (million tonnes).

Rauanheimo offers total logistics services in stevedoring, forwarding, ship transit, agency, Russian customs declaration, container traffic, general and bulk cargo handling. The company also offers added-value services such as transports, handling of the goods at departure and arrival, documentation of the entire chain and customs clearance. Rauanheimo designs competitive logistics solutions that will save customers time and money by combining different services for the customers' needs.

Using its ability to adapt, change and chase new challenges, Rauanheimo has undergone significant growth in recent years and has operations also in Russia. Close collaboration with customers allows Rauanheimo's dedicated team of professionals to develop tailored solutions that add genuine value to its customers' logistics chains.

Rauanheimo is a dependable partner thanks to three basic principles that have remained unchanged for the last 135 years: family culture, expertise of employees at every operational level, and focus on the customer.

Rauanheimo is strategically expanding operations in Finnish ports, allowing them to serve customers in the areas of the customer's choice.

The major new dry bulk projects are in the ports of Tahkoluoto in Pori, Port of Koverhar in Hanko and the port of Mussalo in HaminaKotka. Total investments come to around \in 66 million.

THE PORT OF TAHKOLUOTO

The project completion and significant increase in the cargo handling capacity will provide substantial growth of the cargo flows, particularly bulk, through the new terminal. The new bulk terminal will be put into operation in the autumn 2020.

Rauanheimo's CEO Joakim Laxåback shares the company's plans: "We are building a large automated bulk terminal consisting of effective facilities and equipment for handling big bulk cargo flows. Through automation of the terminal operations we create opportunities for moving the goods quickly, securely and energy-efficiently. The objectives of ensuring quick turnaround time for the wagons, short ship waiting time, as well as handling cost optimization will be achieved at the terminal with utilization of the highquality equipment manufactured by ThyssenKrupp and advanced technologies. The terminal is equipped with two wagon tipplers for unloading wagons, heating terminals for frozen cargo in wagons, stacker, reclaimer, shiploader, water spreading systems and covered conveyors. Our terminal will provide customers with a full range of services such as discharge of wagons, storage of cargo, magnet cleaning, crushing, quality control at the sampling station, as well as loading of the vessels. Paying much attention to the environmental issues, we have implemented advanced technologies of dust minimization, including effective water injection during unloading and storage of bulk commodities, water spraying and dustless covered conveyors."



Rauanheimo started operations in Tahkoluoto in February 2018. The important competitive strengths of Tahkoluoto include its perfect accessibility due to both the deep fairway (15.3m) and excellent railway connection, which is a part of the Finnish–Russian railway network. Rauanheimo has developed good co-operative relationships with third parties, one of which is VR Transpoint, Rauanheimo's partner regarding railway transportations.

Rauanheimo believes that the implemented investment project will significantly increase the scale of its operations in Tahkoluoto, as well as positively contribute in the development of the port.

THE PORT OF MUSSALO (HAMINAKOTKA)

A new investment project started in the beginning of the year to increase covered terminal and unloading capacity and increase efficiency in Mussalo bulk terminal.





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Rauanheimo has invested in a total of $32,000m^2$ of bulk warehouses of totally and operates a total of $48,000m^2$. All the terminals are equipped with unloading terminals for Russian wagons and with conveyor systems from quay to warehouse also for import traffic. A newly added wagon unloading station will be finished in August 2020. The new station will increase the wagon unloading capacity with I–I.5mt per year. The terminal is suitable for fertilizers, grain, limestone-, kaolin- and other similar bulk products. The draught of I5.3m enables loading and unloading of larger vessels such as Panamax and Capesize class.

In order to achieve efficient handling of railroad wagons, Rauanheimo will, together with the Port of HaminaKotka, invest in two additional railway tracks at the port for a total area of 1,200m.

PORT OF KOVERHAR (HANKO)

Since 2015, Koverhar Harbour that used to belong to a steel mill has been run by the Port of Hanko, the fastest-growing port in Finland with excellent connections to continental Europe and over 100 years of know-how.

Rauanheimo is the operator in the port and the goal is to develop the port of Koverhar and its operations in the long term for both transit and domestic traffic and for various product segments. At the end of 2019, Rauanheimo started largescale bulk handling through Koverhar. The aim is to handle approximately 1.5mt of bulk products during the first 12 months. Rauanheimo invested in cargo handling equipment at Koverhar and the Port of Hanko has invested in basic infrastructure.



The tailored equipment includes, for instance, of: two Mantsinen 300 port cranes which are the largest hydraulic cranes in the world; Komatsu and Volvo wheel loaders; and Komatsu dump trucks in the size category of 170 tonnes. The unloading of the wagons is done using two gantry undercarriage excavators. These are tailormade together with Volvo in Sweden and Ab A. Häggblom Oy, which is a modern engineering workshop based in Finland.

The large investments made by the Port

of Hanko in the infrastructure of the port is completed and now in efficient use with growing traffic. This enables the realization of an effective transport of railway wagons to Koverhar. In 2020 the rail traffic to Koverhar is expected to reach approximately 1.5mt.

Rauanheimo sees Koverhar as an excellent opportunity also for the domestic export and import traffic and discussions related to this have already started with different parties.



Aerial view of the Port of Koverhar.



Wood chips - new import product for Inkoo Shipping

WOOD-BASED FUELS ARE THE MAIN SOURCE OF RENEWABLE ENERGY IN FINLAND

In Finland bioenergy has a key role in the production of renewable energy. Bioenergy production is largely integrated into forestry and forest industry.

According to Ministry of Agriculture and Forestry of Finland in recent years, energy derived from wood fuels has accounted for around a quarter of Finland's total energy consumption. The major share of wood fuels is derived from the by-products of the forestry industry, including black liquor derived from the pulp-making process and bark, sawdust and other industrial wood residues. Also logging residues or other low value biomass from silvicultural and harvesting operations are used for energy generation.

In 2018 the total consumption of wood fuels was 105TWh (terawatt hours). Wood fuels represented the most important energy source in Finland, covering 27% of the total energy consumption (Statistics Finland, 2018).

POWER AND HEAT IS GENERATED FROM BARK, SAWDUST AND LOGGING RESIDUES

Solid wood fuels are an important source for heat and power generation in Finland. According to statistics, in 2018 heating and power plants consumed nearly 20 million solid cubic metres (38TWh) of solid wood fuels. Forest chips are also a remarkable source of energy in Finland. The branches, crowns and stumps of harvested trees cannot be used by industry to produce timber goods or pulp and paper, but they



can be chipped to make wood-chip fuels that can then be used to generate energy. The use of forest chips has increased almost eightfold since 2000.

INKOO SHIPPING OFFERS SERVICES TO HANDLE RENEWABLE ENERGY FORMS

As the forms of energy sources are changing from mainly coal to renewable energy, Inkoo Shipping is also offering old and new customers services to handle these new energy sources. "We have now started co-operation with a customer that imports wood chips and we expect to have several companies who have shown interest to start importing bioenergy," says Inkoo Shipping's Traffic Manager Tomas Damén.

"Earlier we have already handled, for example, energy wood and wood pellets, which are also forms of bioenergy. This trend in heat and power generation moving

from fossil fuels to renewable energy sources is well known and the changes are now starting to happen, and we welcome it," continues Damén

READY FOR NEW PRODUCTS AND NEW CUSTOMERS

Damén explains that Inkoo Shipping has, over a long time, been investing in such machines and equipment that allow it to handle these products effectively. "Our wheel loaders have such grabs which enable loading of high trucks on which these lighter products are transported. Also, cranes have bigger grabs and grabs that are fitted to handle stocks and logs. With our machine park, we can serve customers effectively immediately. The one thing that needs to be increased is the storage space but we own the areas around us so that is no problem," Damén concludes.



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Indexator's XR rotators gaining market share in material handling and recycling



Major rotator manufacturer Indexator Rotator Systems AB, based in Sweden, is increasing the reach of its popular XR rotators.

The company's XR rotators are reliable partners in areas where the requirements for rotator functionality are very high. Examples of these are in forestry, timber handling, material handling, scrap sorting, demolition and at recycling stations. "The reception of XR has been very good and we are continuously working on further development of the programme," says Johnny Karlsson, Area Sales Manager at Indexator Rotator Systems.

With its well-dimensioned hydraulic connections and extremely high torque, the XR series is a broad product range for demanding applications. XR is designed for excavators and the most major





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Torque at 25

	-8							
	XR 300		XR 400		XR 500		XR 600	
		XR 300	XR 400	XR 400 I	XR 500	XR 500 C	XR 600	XR 600 C
Max axial static load*	Ļ	Max ±300 kN	Max ±550 kN	Max ±550 kN	Max ±700 kN	Max ±700 kN	Max ±850 kN	Max ±850 kN
Max axial namic load	•5*	Max ±90 kN	Max ±200 kN	Max ±200 kN	Max ±250 kN	Max ±250 kN	Max ±300 kN	Max ±300 kN

4,100 Nm

7,000 Nm

*Max axial static load indicates the product's theoretical maximum load for floating applications without accelerations.

3,000 Nm

4,100 Nm

applications. All of the models in the series have modular designs that make them service friendly and flexible. The engine and swivel are integrated and the unique, patented transmission insulates the engine and swivel from external loads, which means long service life.

"XR is a multi-sized modular system that can be offered with more functionality such as extra channels, electric swivel, oil distributor, fixation points and hose protection," says Karlsson.

The XR programme is already available in a number of sizes with lifting capacities between 9–85 tonnes depending on application, use and assembly.

The XR rotators are constructed to handle forces from very large loads. Regardless of whether forces are at rightangles or come from the same direction, the XR rotators are extremely durable, powerful and enjoy long service lives. They have higher torque than all other solutions and can withstand high flows with very low pressure drops. The result is performance that exceeds requirements for even the heaviest jobs.



7,000 Nm

The XR rotators perform independently of any climate and can handle the most extreme conditions of cold, heat and underwater.

Thanks to the XR-series' patented design and the floating power transmission, external forces acting on the bearings do not affect engine and swivel inside the XR rotator.



XR IN BRIEF

- service friendly;
- low profile, well protected design;

7.000 Nm

7.000 Nm

- vane engine with extremely high torque;
- handles radial and axial forces thanks to its swivel base bearing;
- patented torque transfer;
- leak-proof, water resistant;
- extra channel for central lubrication;
- relief valve integrated in the engine;
- unique interface enables robust incorporation; and
- direct drive with a strong, tolerant vane engine means no gearing is necessary

ABOUT INDEXATOR

Indexator Rotator Systems AB is a major manufacturer of rotators, swivels and accessories. Today, Indexator is an extremely strong brand in the forestry, material handling and recycling industries all over the world. The company conducts world-class R&D that includes a dedicated, in-house test lab upon which international equipment manufacturers also rely when developing new products and functions. DCc

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A regional report on the



Port of Tyne first UK port to become a connected ports partner

The Port of Tyne has announced it will be the first UK port to join the Connected Ports Partnership.

The global data and resource sharing initiative was welcomed by the new Maritime Minister, Kelly Tolhurst MP, as she congratulated the Port of Tyne on being at the forefront of driving innovation across the North East's international logistics cluster.

She commented: "The development of our world-leading maritime ports is fundamental to our success as a global trading nation and I'm delighted to see the Port of Tyne become the first in the UK to join this exciting partnership.

"This announcement underlines our commitment to a smarter, cleaner and more efficient maritime industry that supports 181,000 jobs and generates billions of pounds for the economy."

Connected Ports is a collaboration between a network of global operators, which include the ports of Rotterdam, Gdansk, Helsinki, Hamburg and Los Angeles.

In order to take major steps forward in

the efficiency and cost reduction of world trade lanes and reduce carbon emissions, it is necessary to have a shared logistics system. Through pooling data and resources, the Connected Ports Partners aim to transform the way ports operate.

Matt Beeton, Chief Executive Officer, Port of Tyne, said: "We are excited to join this innovative, world-leading and collaborative initiative. We look forward to learning from each other and being the first in the UK to work towards cocreating a global hub of connected ports extending important maritime by developments such data as standardization."

Since launching the UK's first Maritime 2050 Innovation Hub, the Port of Tyne has been collaborating to develop solutions to technological challenges facing the maritime sector and the wider logistics industry.

Joyce Bliek, Director Digital Business Solution, Port of Rotterdam, said: "The Connected Ports Partnership is about cocreating new models of data exchange, and collaboration is vital for sustainable development across international gateways. Ports have a major role to play in using smart technology that can improve global logistics."

The first step in joining the Connected Ports Partnership will see the Port of Tyne advance the seamless trade in sharing data by adopting shared technology to codevelop a mutual platform for monitoring shipping and environmental data.

Established in 2019, Port of Tyne is one of the UK's major deep-sea ports operating in bulks, break bulk, offshore, rail-freight, automotive, cruise and ferry, logistics and estates.

One of the UK's largest Trust Ports, the Port of Tyne is entirely self-financing, it receives no Government funding, is run on a commercial basis and reinvests all profits back into the Port for the benefit of all of its stakeholders, who are customers, employees, business, Government and community.

During a decade of development, the Port of Tyne has invested over $\pounds 130$ million in diversifying its operations to handle a growing range of commodities.

Port of Blyth – contingency planning for COVID-19

As a major commercial port the Port of Blyth has been deemed an essential service by Government in relation to COVID-19 and its employees have been classified as key workers.

The port is therefore doing everything in its power to remain open during the COVID-19 epidemic, to ensure that goods and raw material reach retail outlets and businesses and that critical infrastructure relating to offshore energy production continues to be installed, maintained and repaired.

As a result, all port customers can rest assured that they will be able to rely on Blyth's continued service throughout this period. In addition, if any customers are having difficulty sourcing subcontractors, the port is are working closely with many subcontractors whose staff have also been designated as key workers as part of the transport and logistics supply chain, and asks that customers get in contact so that it can offer assistance.

PROTECTING STAFF, CLIENTS & VISITORS

The port continues to review a set of robust measures put in place to protect staff and all contractors on site including but not limited to: increased hygiene and cleaning routines, isolating key staff (e.g. pilots and crane operators), enforced social distancing and remote working wherever possible. All tenants and clients are asked support this action to protect everyone working on site.

TENANTS

Tenants have full rights of access as per their tenancy agreements on the basis that

they follow all official advice on limiting the spread of COVID-19. Tenants are asked to limit the number of staff on site where possible.

VISITORS

Visitors will only be allowed on site in essential circumstances. No attempt should be made to access any site without contacting Port of Blyth beforehand. If any visitor is experiencing COVID-19 symptoms including a cough or fever, they should not come on site, and should follow official self-isolation advice.

HEALTH & SAFETY

Any concerns or queries relating to Health & Safety should be directed to the port's HR & Safety Manager Stuart Balmer-Howieson.

Port of Ipswich celebrates new contract with haulage services provider

Associated British Ports (ABP) has celebrated a new haulage services contract with skilled labour and port services provider Felixstowe Agencies Ltd (FAL) at the Port of Ipswich to enhance its customer offer at the port.

In addition, FAL has purchased 14 new vehicles to enhance their services, investing $\pm 300,000$ and reaffirming its commitment to the project.

Tim Meyer, Managing Director for FAL, said: "We are delighted that ABP has appointed Felixstowe Agencies Ltd to carry out haulage services at the Port of lpswich, providing a seamless and efficient service to its customers. We look forward to a mutually beneficial partnership."

The Port of Ipswich has also recently invested more than £4 million in two new bulk storage terminals, the Orwell Bulk and Cliff Bulk Terminals, adding more than $7,000m^2$ of storage space, and also unveiled a new fertilizer bagging and blending facility at the port.

Speaking on behalf of one of ABP's customers at the port, who will benefit from the new contract, Andrew Merton, COFCO International UK Fertiliser Trading Director, said: "COFCO International UK imports a significant quantity of bulk fertilizer products to the Port of Ipswich.

"Therefore it is key to our business that we receive the highest possible discharge rates. Cargo handling and transport are a key component to this, and the effective movement of product from vessel to store is vital. We have witnessed a significant



improvement in the servicing of our business through the Port of Ipswich."

Across its network of 21 ports, ABP has many years of unparalleled expertise in safely handling a wide range of sensitive agricultural materials, including high value combinable crops, fertilizer, feed and supplements. Andy Constable, ABP's Head of Operations at the Port of Ipswich, said: "We are proud to have been working closely with Felixstowe Agencies Ltd. since 2013 to service customers at the Port of Ipswich and we look forward to continuing our collaboration in future."

UK ports seize Freeports opportunity

UK port organizations have welcomed the launch of a ten-week consultation by the government which aims to establish up to ten new freeports across the UK.

The government wants to announce the location of the new zones at the end of this year so they can be open for business in 2021, in the wake of the UK leaving the EU. The consultation is due to run until 20 April 2020, following which the Government will invite sea, air and rail ports to bid for Freeport status on a competitive basis.

Chief Secretary to the Treasury, Rt Hon Rishi Sunak MP, said: "Freeports will unleash the potential in our proud historic ports, boosting and regenerating communities across the UK as we level up. They will attract new businesses, spreading jobs, investment and opportunity to towns and cities up and down the country." Sunak visited ABP's Port of Southampton to discuss the role ABP's ports could play in delivering the policy. ABP said it has been a strong supporter of freeports since the publication of Sunak's paper The Free Ports Opportunity' in 2016.

The Port of Dover and Port of Tyne said they welcomed the consultation. The Port of Tyne has been championing a 'virtual freeport', connected and secure using supply chain technology and harnessing best practice from the USA and China where these zones are operational.

PD Ports said Teesport bosses have lobbied hard in recent years to highlight the potential benefits of Free Ports in supporting future trade growth.

Benefits of becoming a freeport could include goods brought into a freeport not attracting tariffs until they leave the freeport and enter the domestic market; no duty payable if they are re-exported; and when raw materials are imported and processed into a final good, duties are only paid on the final good.

The government said freeports will also offer opportunity for cutting-edge customs, transport and green technologies to be trialled in controlled environments, before being adopted more widely in relevant sectors of the economy.

In October 2018, the European Parliament published a study into 'Money laundering and tax evasion risks in free ports'. According to The Guardian, the European Commission introduced new rules governing freeports on 10 January, as a result of the "high incidence of corruption, tax evasion, criminal activity".

Note: It is expected that the COVID-19 crisis may have an impact on the timescale of this initiative.

UK major ports: coronavirus impact and Government Emergency Powers

Commenting on how the UK's largest port operators are facing the challenges of coronavirus / COVID-19, Tim Morris, CEO of the UK Major Ports Group, said on 18 March 2020:

"The UK's major ports are resilient and have coped with large scale upheaval before. Right now their priorities are the well being of colleagues and keeping British supply chains moving. Our ports are the gateways for 95% of goods entering or leaving the UK— including, for example, half our food needs — and are taking a wide range of business continuity measures to ensure that they stay open.

Some types of trade — such as with Asia — have been disrupted for some weeks, although are likely to bounce back in the near term. Some types of activity such as cruise — will be significantly disrupted for some time. However, many other types of trade are for now continuing at near normal levels.

The most important things the

Government can do for the major ports sector at this time are to recognize its critical role in essential supply chains in terms of testing and fuel supplies, work directly or via banks to keep cash flowing to our supply chain partners and, with respect to the new Emergency Powers, ensure that Government Agencies are sufficiently staffed so that they don't have to close down otherwise well-functioning ports."

COVID-19 and UK Seafarers: Joint Statement by Nautilus International, RMT and the UK Chamber of Shipping, released on 23 March 2020

"As organizations representing the interests of seafarers and employers in the shipping industry, we are united in our determination to protect the national interest from the economic impact of the COVID-19 emergency.

"Our members must be empowered by Government, urgently, to perform the shipping industry's key logistical role in keeping the UK supplied with the food, medicine, fuel and equipment required to sustain people and businesses during this period of unprecedented national and international emergency.

"As a priority, the diverse range of onshore and onboard skills required to operate merchant vessels from the UK ports network must be protected from long term damage. Alongside the welcome government support announced for the payment of wages and company sick pay, the preservation of jobs and skills particularly for seafarers and other key workers affected by COVID-19, must now be the focus of joint industry and government action.

"The collapse in passenger demand in particular is expected to last for the foreseeable future as countries attempt to ride out the COVID-19 storm. We believe that Government has a central role to play in backing our seafarers and business throughout this profoundly difficult time and we stand ready to continue the work with Government to agree an effective package of measures to achieve this.

"As such, we call on the UK Government and devolved administrations to exercise all the policy levers at their disposal to protect seafarer jobs and qualifications. Seafarers will always be needed to make the global economy work for the national interest and the maritime skills base will be even more important once we emerge from the other side of this global pandemic."

ABOUT NAUTILUS INTERNATIONAL

Nautilus International is the trade union and professional organization for maritime professionals at sea and ashore. lt represents 20,000 maritime professionals including ship masters (captains), officers, officer trainees (cadets) and shipping industry personnel, such as ship pilots, inland navigation workers, vessel traffic services operators (similar to air traffic control), harbourmasters, seafarers in the oil and gas industry, and shore-based staff.

Scotland's largest agri-hub fully operational at the Port of Rosyth with the arrival of 30,000 tonnes of animal feed



Scotland's largest agricultural products hub (agri-hub) is now fully operational at the Port of Rosyth with the arrival of the *Baltic Mantis* bulk cargo ship and her load of over 30,000 tonnes of animal feed from Argentina at the end of February 2020.

As part of a long-term partnership with Forth Ports and Cefetra Ltd, the Fife port has now become the main Scotland's principal agri-hub, handling an extensive range of agricultural products for the Scottish animal feed, food and drink and farming industries.

To create the unrivalled agri-hub, the Port of Rosyth has been deepened to provide a true deep-water port capable of taking vessels carrying up to 50,000 tonnes of cargo. Its existing storage facilities have been significantly extended with the addition of a new, 200,000ft² purpose built agricultural products terminal, increasing the port's storage capacity to around 100,000 tonnes. The terminal was built by Luddon Construction and the port manages all the operations in the store.

The port has invested in a new Liebherr mobile harbour crane for bulk handling capability at the agri-hub. This new crane is a state-of-the-art mobile harbour crane with powerful transmission and advanced electronics for bulk handing.

To further enhance the port's bulk handling process, and to manage dust emissions, a new SAMSON ecological hopper is also now in place at the port. The eco hopper is the first of its kind in the UK and forms a key component of the new agri-bulk hub facility. (Read more about the SAMSON ecological hopper on page 86 of the January 2020 Issue of *Dry Cargo international*.)

Derek Knox, Senior Port Manager, The Port of Rosyth said: "This is an exciting time for the Port of Rosyth as we see another significant investment programme for our customer, Cefetra, reflecting our strategy of working in partnership to deliver supply chain solutions reach fruition. This new agri-hub and our new Liebherr mobile harbour crane bring together the port's unrivalled logistics links as well as its excellent marine capability. It's also great to see the new SAMSON eco hopper in use. This is a key part of our dust control at the port. My thanks also to the Luddon Construction team who delivered the new terminal warehouse ahead of schedule."

Andrew Mackay, Managing Director at Cefetra Ltd, said: "We are very pleased with the new Rosyth agri-hub development. We would like to thank Forth Ports and their contractors Luddon, Liebherr and Samson for delivering these excellent purpose-built facilities. The agrihub will increase the efficiency of our supply chains, allowing us to take advantage of scale and location, bringing additional benefits to our customers and to Scottish agriculture for the long term."

Rosyth's location and logistical links to the motorway network, make it ideally suited to supply all areas of Scotland and Northern England. In addition, Rosyth, being near to continental Europe, has advantages in short sea freight.

ABOUT FORTH PORTS

Forth Ports Limited owns and operates eight commercial ports in the UK – Tilbury on the Thames, Dundee on the Firth of Tay and six on the Firth of Forth – Leith, Grangemouth, Rosyth, Methil, Burntisland and Kirkcaldy. Within and around the Firths of Forth and Tay, Forth Ports manages and operates an area of 280 square miles of navigable waters, including two specialized marine terminals for oil and gas export and provides other marine services, such as towage and conservancy.

ABOUT CEFETRA LTD

Cefetra Ltd is the largest agricultural trading company in Scotland with an annual turnover of $\pounds I$ billion. The business, headquartered in Glasgow Scotland, is active throughout the UK and Ireland, trading over four million tonnes annually. It dispatches between 75,000/85,000 tonnes of raw materials to industry partners every week and delivers 500/550 lorry loads per day.

Careful unloading of iron ore pellets with SCHADE wagon tippler



At the Baltic Port of Ust-Luga, around 100km west of St. Petersburg in Russia, export capacity is being expanded further by the port logistics company Ultramar. This first-time customer of SCHADE Lagertechnik GmbH has ordered equipment for the outdoor stockyard of a new iron ore terminal.

Back in the sales phase SCHADE supplied fundamental technical solutions for the outdoor stockyard design. The order comprises a portal reclaimer with a capacity of 2,500tph (tonnes per hour) and a rail span of 46m, a rotating stacker at a capacity of 1,800tph and boom length of 37m, and a wagon tippler with a capacity of up to 1,800tph. The SCHADE supply package also includes two hybrid apron feeders with a capacity of over 850tph each which are being delivered by AUMUND Fördertechnik.

The machines are to stack and reclaim

iron ore pellets for Lebedinsky GOK, which describes itself as operating the largest plant in Russia and the CIS for the mining and processing of iron ore, and has been a customer of AUMUND for many years. The specialized SCHADE technology guarantees that the iron ore pellets are not damaged during handling. This is for example achieved by defining a 32° tilt for unloading material from the wagons into the bunkers. The boom of the stacker is structured to tip the fragile pellets with a drop of less than Im.

Commissioning of the equipment at Ultramar is planned for the end of 2020/ beginning of 2021.

ABOUT THE AUMUND GROUP

The AUMUND Group is active worldwide. The conveying and storage specialists has special expertise at its disposal when dealing with bulk materials. With their high degree of individuality, both its technically sophisticated as well as innovative products have contributed to the AUMUND Group today being a market leader in many areas of conveying and storage technology.

The manufacturing companies Fördertechnik AUMUND GmbH (Rheinberg, Germany), SCHADE GmbH Lagertechnik (Gelsenkirchen, Germany), SAMSON Materials Handling Ltd. (Ely, England), as well as AUMUND Group Field Service GmbH and AUMUND Logistic GmbH (Rheinberg, Germany) are consolidated under the umbrella of the AUMUND Group.

The global conveying and storage technology business is spearheaded through a total of 19 locations in Asia, Europe, North and South America and a total of five warehouses in Germany, USA, Brazil, Hong Kong and Saudi Arabia.

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Multi-purpose Orts grabs - proudly made in Germany

For over 45 years now, German manufacturer, Orts GmbH, has been producing a complete range of bulk-handling grabs for operators, stevedoreand shipping companies using mechanical-rope, electro-hydraulic and diesel-hydraulic equipment in either orange-peel or twoclamshell designs. Also, lifting beams up to 100t capacity are available.

When you have to combine high productivity, reliability and flexibility in handling all kind of dry bulk cargo, the Orts independent diesel-hydraulic grabs are especially suitable.

Orts grabs are suitable for all types of dry bulk cargo. Of course, each type of material has its own physical characteristics, which could mean having to design a grab for specific products. "However, in most cases, shipping and stevedoring companies need an 'all-round' grab, which they can use to handle different types of cargo efficiently," explains Sigvard Orts, adding that scrap metal, pig iron, HBI and large stones also fall within the range of such equipment too.

For this kind of bulk cargo the independent diesel-hydraulic grabs are available as orange-peel grabs with the ability to handle bulk cargo with high density. The biggest diesel-hydraulic orange-peel grab from Orts has a 12m³ capacity. This DHM 12m³ is in use to discharge HBI.

In terms of productivity, Orts emphasizes that this is dependent on three key factors: low dead weight, kinematics and the closing force of the knives. In fact, a 12m³ Orts independent diesel-hydraulic grab could in theory achieve average loading rates of around 350–450 tonnes per hour (this depends on the density of the bulk cargo).

"The reliability of the grab is also extremely important when discussing productivity. It is pointless to buy a cheap grab, if it then breaks down during vessel handling, effectively prolonging the length of the port call. The grade of filling is also crucial; the better the grade of filling of the grab, the shorter the loading/discharge time," stresses Orts.

While other bulk discharge equipment manufacturers stress their ability to contain dust emissions, Orts underlines the fact that a well-maintained grab will produce less spillage and that, in reality, most dust emissions are made when discharging dry bulk consignments into hoppers. In fact, Orts GmbH developed a 100% covered grab in the 1980s,





specifically to address environmental concerns.

Quizzed as to whether purchases of grabs are driven by price or technology,

Orts unhesitatingly replies that both are important.

"Technologically, the knives on our grabs offer a high closing force and have

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MARCH 2020



optimized kinematics. Add to this a high discharge rate and all-round reliability with a reduced need for parts replacement and you have a very cost-effective piece of equipment, especially when you consider the price over the whole life time of a grab," Orts points out.

Outright purchase is still the preferred acquisition method, while maintenance can be relatively easily undertaken by a competent mechanic, argues Orts, adding that in emergency cases the company is nevertheless prepared to despatch its own engineers worldwide.

Recent contracts were made with customers in Germany, Norway, Australia and Indonesia.

The unique independent radio controlled diesel-hydraulic grabs again proved themselves as 'trouble shooters'. For the second time within the last 12 months a few of those grabs were rented and shipped to empty a vessel, because the grabs on board (from another grab maker) and the harbour equipment failed.

Orts manufactures only in Germany in its own workshop and the suppliers for hydraulic parts, cylinders etc. are also based in Germany. Orts grabs are real products that are 'Made in Germany'.



Bruks Siwertell secures high-capacity ship unloader contract for Taiwanese power plant



Bruks Siwertell has signed a contract that will see it deliver a high-capacity coal unloader for Taiwan Power Corporation's 5,000MW Taichung power-generation facility. A condition of the contract is that the Siwertell screwtype ship unloader will be delivered completely assembled by February 2022.

"The delivery timescale was one consideration for the order, the others were that the unloader had to compete on three platforms: price, power consumption and operational costs," says Per Karlsson, Siwertell President. "In an open, international bidding process, the equipment that offered the lowest total cost, across all three factors, was awarded the contract; and that was us. The Siwertell ship unloader excelled in all areas."

The rail-travelling Siwertell 940 Dtype unloader will have a rated coalhandling capacity of 2,200tph (tonnes per hour), with a guaranteed average capacity of 1,650tph; equivalent to 75% efficiency. It will replace two existing coal grab crane unloaders and will be delivered by heavy-lift ship.

"Taiwan Power Corporation knows what to expect from a Siwertell unloader," Karlsson adds. "This is a returning customer with the first two units sold to the operator in 1982. After this we delivered two unloaders to its Hsinta power plant and then a further two to the Talin power station, both in Taiwan."

The Hsinta and Talin power stations

also operate Siwertell 940 D-type unloaders, putting Taiwan Power Corporation at an advantage when it comes to servicing and parts.

ABOUT BRUKS SIWERTELL

Bruks Siwertell is a major supplier of dry bulk handling and wood processing systems. The company designs, produces and delivers systems for loading, unloading, conveying, storing, and stacking and reclaiming dry bulk materials, alongside equipment for screening, milling chipping, and processing wood for the biofuel, board, saw mill, pulp and paper industries. All equipment is designed to ensure environmentally-friendly and efficient operations.

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When more is less

A GUIDE TO REDUCING CONVEYOR BELT EXPENDITURE

Cargo terminals spend many millions every year repairing and replacing conveyor belts. Here, conveyor belt specialist Leslie David provides a compelling insight into why much of that expenditure is wasted and how a more pragmatic approach to belt selection can significantly reduce such wastage. In the pursuit of greater economy, sometimes more really can be less.

Conveyor belt technology has advanced enormously in recent years. Conveyor

operators should therefore rightly expect considerably longer operational lifetimes compared to what was acceptable as recently as five or ten years ago. However, the fact is that most operators continue to repair and replace belts much more frequently than they should need to. The good news is that it can be surprisingly easy to achieve significant reductions, both in the frequency of belt replacement as well as belt repairs and maintenance simply by being aware of commonplace deceptions and misconceptions.

WHAT IS THE **TRUE** COST OF A CONVEYOR BELT?

Although sales people will always maintain that making a choice based on price rather than the quality of the product is not the best way to make a decision, the fact remains that price is important because conveyor belts are costly items. The reality is that price will almost invariably be the number one factor in the selection criteria.

Conveyors play a vital role and have to cope with demanding environments and materials and it is the conveyor belts themselves that are invariably the most vulnerable component. Their durability and reliability are therefore critical factors, both in terms of productivity and in budgetary management. Despite this, the preoccupation still seems to be the price of the belt rather than its 'whole life cost'. This almost invariably means buying lowpriced belts, the vast majority of which originate from Asia.

PRICE IS VERY RARELY AN ACCURATE MEASURE OF ULTIMATE COST

When visiting ports and terminals I have often found myself shaking my head in disbelief when I come across buyers of conveyor belts who are absolutely convinced that they are getting a good deal because the price they are paying can be as much as 30% (or more) lower than the more well established 'premium quality' brands. The fact that they will almost certainly have to buy at least two and quite possibly three 'economy' belts instead of one, good quality harder-wearing 'expensive' belt over the same period seems to be ignored.

The true economic value of a conveyor belt can only be properly established by calculating the 'whole life' cost. This is



simply achieved by adding the price paid to other known associated costs such as fitting, repairs and maintenance. Lost production time is another important cost to factor in. The total is then divided by either the actual (or anticipated) operational lifetime (measured in either weeks, months, years or running hours) or

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up the vast bulk of the total manufacturing cost, it is perfectly reasonable to conclude that materials of a lower quality have been used to achieve that difference. For example, the pressure to keep costs to an absolute minimum means that recycled rubber of highly questionable origin may well have been used in the mix. Another cost-saving method is to use cheap 'bulking' fillers to replace part of the rubber polymers in the rubber compound.

The tell-tale signs to look for when evaluating quality can be broken down to the two main constituent parts of a conveyor belt, which is the carcass and the rubber covers used to protect that carcass.

THE CARCASS

The type of belt most commonly used for transshipment is rubber 'multi-ply' with a

alternatively by the tonnage carried. In my experience it is surprisingly rare to find a conveyor operator who makes such calculations. It may be hard to believe but some do not even keep records of when old belts are replaced with new ones.

WHY THE DIFFERENCE?

Perhaps the question I am most often asked is how there can be such huge differences price between one belt in supplier/manufacturer and another for belts of apparently the exact same specification. There are two equally valid answers to that question. The first lies in the cost make-up of producing a conveyor belt. The second is the actual quality of the belt including the kind of trickery and deception that many manufacturers and suppliers use nowadays to create the illusion of quality.

THE COST OF PRODUCING A CONVEYOR BELT

There can never be a fixed formula due to the wide variety of individual belt specifications but the influence of raw material costs on the selling price is hugely significant. As a general 'rule of thumb', raw materials constitute some 70% of the total cost of producing a conveyor belt. The general overheads element is generally around 10%. Thanks to the high level of automation, the actual labour cost element is very low. You are unlikely to see more than three or four people manning a typical production line. This last fact certainly shoots down the usual assumption that belts imported from Asia are lower priced because their labour costs are much lower than those in Europe.

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polyester/nylon (EP) fabric reinforced carcass protected by an outer cover of rubber. It is the carcass that provides the inherent characteristics of a conveyor belt such as its tensile strength and elongation (elasticity or 'stretch' under tension).

Although the belts being offered may state the same specification, there can be huge differences in the actual quality of the fabric plies. In low quality (low cost) fabrics, although the amount of material used in the longitudinal strands (warp) of the fabric may be adequate, the amount of transversal (weft) material is kept to an absolute minimum in order to reduce cost. Although the required tensile strength is achieved, albeit with a low safety factor, rip and tear resistance is reduced and elongation (stretch) is low.

Low elongation may not sound overly important but if the elongation is too low then this can cause a number of problems including a general inability to accommodate the contours of the conveyor and its drums and pulleys. This can quite easily lead to the premature failure of the belt.

WHAT TO WATCH OUT FOR

A method of cost (price) cutting that is now becoming an increasingly common practice is the use of totally polyester (EE) fabric plies in a carcass that is declared as having an EP carcass (polyester/nylon mix) construction. The reason for this deception is that the cost of EE fabric is some 30% lower than the cost of EP fabric. This helps the seller to achieve the perception of a lower 'like for like' price. This may sound relatively harmless but the seriousness of the physical effects are huge. The biggest danger is that a polyester weft can cause low transverse elasticity, which reduces both the troughability and impact resistance of the belt and consequently also causes tracking issues. In addition, less weft in the belt can also reduce rip resistance, fastener strength and ability to handle small pulley sizes.

THE COVERS

As the rubber used for the outer covers is the single biggest element of cost when manufacturing a conveyor belt it is consequently the single biggest opportunity for manufacturers to economize. There are many different types of rubber compound used for rubber multi-ply belts because modern-day belts have to deal with a multitude of different (and often combined) demands. Most of the rubber used in conveyor belting is therefore synthetic.

There are literally hundreds of different chemical components and substances that are needed to create the synthetic rubber compounds that, once vulcanized, are able to meet the specific physical performance and safety requirements. For dry cargo handling, the four basic aspects that most determine the quality of performance are wear (abrasion) resistance; tear strength, oil resistance and ozone & UV resistance. The greatest influence on the operational lifetime of a conveyor belt comes from the level of abrasion resistance of the rubber.

ABRASIVE WEAR TESTING

Abrasion resistance (ISO 4649 / DIN 53516) is measured by moving a test piece of rubber across the surface of an abrasive sheet mounted on a revolving drum. It is expressed as volume loss in cubic millimeters, for instance 150mm³. The most important thing to remember when comparing abrasion test results (or promises!) is that higher figures represent a greater loss of surface rubber, which means that there is a lower resistance to abrasion. The lower the figure then the better the wear resistance.

Comparing (evaluating) one offer from another is made very difficult by virtue of the fact that (with only one exception that I know of) the technical datasheets provided by manufacturers and traders almost invariably only show the minimum requirement of a particular test method or quality standard rather than the actual performance that the belt being offered would be expected to achieve.

In addition to checking the level of resistance to abrasion it is advisable to check the thickness of the rubber covers when the belt arrives on site. Apart from using the lowest grade rubber possible, another trick used by the suppliers of 'economy belting' is to supply covers that can be up to 15% (or more) thinner than the promised specification. One millimetre here or there may not sound much but it represents a huge cost saving to the manufacturer that they can reflect in the price. At the same time it means 15% shorter wear life for the unfortunate end-user. Suddenly what was a huge price difference is not so huge after all.

OIL RESISTANCE

Many bulk materials, especially grain and biomass, contain oils and resins; either mineral or vegetable/animal. When oil of any kind penetrates rubber it causes it to swell and distort. This results in serious tracking and steering problems, accelerated wear and ultimately premature replacement. There are two recognized test methods for oil resistance, both of which involve almost identical test procedures. These are ISO 1817 and the comparable, slightly less elaborate but equally tough American ASTM 'D' 1460.

'Economy belting' can easily be 15% (or more) thinner than the stated specification.

When evaluating offers for oil resistant belting and looking at the respective quality standards, it is very important to bear in mind that many of the biggest manufacturers of belting in the world use the DIN reference number 22102 G when referring to oil resistant belting. This is very



misleading because the letter 'G' is simply used to denote oil (or grease) resistant belting. DIN 22101 G does not actually contain any requirements, test methods or limits specific to oil resistant belting. This is a classic example of how the use of a test method reference number is designed to provide reassurance to the buyer but in reality is meaningless in terms of actual performance.

OZONE & UV QUALITIES

There is absolutely no question that ALL rubber conveyor belts should be fully resistant to the damaging effects of ozone and ultra violet light. This is because at ground level ozone becomes a pollutant. Exposure increases the acidity of carbon black surfaces and causes reactions to take place within the molecular structure of the rubber. This has several consequences such as a surface cracking and a marked decrease in the tensile strength of the rubber. Likewise, ultraviolet light from sunlight and fluorescent lighting also accelerates deterioration because it produces photochemical reactions that promote the oxidation of the surface of the rubber resulting in a loss in mechanical strength.

Rubber belts that are not fully resistant to ozone and UV can start to show signs of degradation before they have even been fitted to a conveyor. Despite its crucial importance, not least its huge influence on the working lifetime of a belt, ozone and UV resistance is very rarely, if ever, mentioned by traders or manufacturers. This is almost certainly because the antiozonants that need to be added during the mixing process to make the rubber compound resistant to ozone & ultra violet cost money and that, of course, makes the belt less competitive on price. My advice is to always make ozone & UV resistance a

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ENGINEERING & EQUIPMENT

required part of the specification when selecting any rubber conveyor belt.

SAFE TO HANDLE?

The pressure to compete on price has increasingly led to the use of potentially dangerous chemical substances to artificially accelerate the vulcanization process. When the Union's European REACH (Registration, Evaluation and Authorisation of Chemical substances)



All European manufacturers are legally obliged to register the use of 'substances of very high concerns'.

regulation EC 1907/2006 came into force in June 2007 such concerns should have largely been dispelled. The regulations were introduced to improve the protection of human health and the environment from the risks that can be posed by chemicals. All European manufacturers are legally obliged to register the use of "substances of very high concern" (including those believed to cause various forms of cancer) that are listed within the regulations with ECHA (European Chemical Agency).

However, it is important to be aware that manufacturers located outside of EU member states are not subject to the regulations and are therefore free to use unregulated raw materials. However, those who import belts from outside the EU ARE responsible for the application of REACH regulation. Personally, I would always recommend written asking for confirmation from the belt manufacturer or supplier that the product they are offering will be produced in compliance with REACH EC 1907/2006 regulations.

CE MARKING

Compliance with CE quality standards is increasingly being stipulated by purchasers of industrial conveyor belts. However, CE accreditation does not apply to conveyor belts because they are not a product category that is subject to specific directives that are required to be CE marked. The letters 'CE' used in the CE



CE accreditation does not apply to conveyor belts.



A similar CE mark that actually signifies 'China Export'.

Marking are the abbreviation of French phrase 'Conformité Européenne' which literally means 'European Conformity'. The term initially used was 'EC Mark' but it was officially replaced by 'CE Marking' in the Directive 93/68/EEC in 1993.

It is important to be aware of the fact that a very similar mark exists which many potential users may mistakenly believe is a genuine CE mark of European conformity. In reality it actually stands for 'China Export', meaning that the product was manufactured in China.

BE SURE OF WHAT YOU ARE BUYING

A fast-growing and very significant proportion of belting sold in Europe is imported from South East Asia by traders. This is not to say that all belting imported from Asia is substandard because that is not the case. However, random laboratory test of imported belt continues to consistently reveal serious and quite worrying shortcomings.

One such test on a basic abrasion resistant belt revealed that the tensile strength of the carcass was more than 20% below the specified minimum and that the abrasion resistance of the covers was 47% over the DIN Y maximum standard of 150Mm³.

ISO 1431 testing showed that the rubber had virtually no resistance to ozone and began to crack within six hours of exposure. Another set of tests on a fire resistant belt revealed that the 6mm specification of the top cover thickness actually measured only 4mm.

Even more seriously, the belt had a totally inadequate level of fire resistance. In the ISO 340 test the duration of continued burning (visible flame) should be less than 15 seconds for each sample with a maximum cumulative duration of 45 seconds for each group of six test samples. The total time that the six Chinese belt

sample test pieces took to self-extinguish was 102 seconds.

End-users are effectively required to rely on the honesty and integrity of the trader who in turn is reliant on the honesty and integrity of a manufacturer who may well have their own interpretation of test methods and quality standards. European conveyor belt manufacturers could also justifiably argue that they are at a disadvantage. Interestingly but somewhat worryingly, with only one notable exception as far as I can tell, all Europeanbased belt manufacturers import and resell belting under their own brand name to supplement their overall output. This allows them to be more competitive on price. Again, the vast bulk of these imports come from China and to a lesser extent India

SEEK ADVICE

A significant difference in price is best treated with suspicion. As the quality of a belt is usually reflected by its price it is always worth the effort to check and compare the original manufacturer's specifications very carefully and ask for documented evidence of compliance and performance. As I mentioned earlier, the only way to assess value for money is to know the true cost. Paying a bit more for the superior performance and lower lifetime cost provided by one, good quality belt rather than two or three 'economically priced' belts will almost certainly prove that more really can be less.

ABOUT THE AUTHOR

After spending 23 years in logistics management, Leslie David has specialized in conveyor belting for over 13 years. During that time, he has written numerous technical guidance bulletins and is one of the most published authors on conveyor belt technology in Europe.



Recent Bedeschi contract includes pipe and apron conveyors

Bedeschi has recently been awarded — by KHD, Lehigh Mitchell — an important contract related to clay crushing and handling. Bedeschi is supplying: two complete crushing units, composed of an apron feeder and a double roller crusher; one blending stacking and reclaiming longitudinal system for limestone; a clay apron conveyor; and a 700m-long pipe conveyor for cement. The pipe conveyor is similar to the one in the image below.



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TMSA enclosed belt conveyor – safeguarding the environment



he expertise of Brazilian company TMSA contributes to great environmental solutions in port terminals in urban centres.

TMSA — Tecnologia em Movimentação — has been active for 53 years, and has its own development facilities. Through its globally recognized partnership, the company offers integrated solutions that comply with international standards, and with the needs of all its clients.

TMSA's projects stand out due to their reliability, safety and durability; they also integrate issues such as cost, environment, social and infrastructure. With its headquarters in Brazil and offices in Latin America and the United States, TMSA's business strategy is focused on product and market innovation and diversification, especially in areas such as port terminals, agribusiness, mining, power plants, fertilizer industry, renewable energies (biomass).

Using all the expertise that it has gained from previous projects, and having a highly qualified technical team, TMSA has nationalized the enclosed belt conveyor technology. These conveyors are designed for the transport of bulk materials. Their main characteristic is to be completely enclosed, ensuring maximum efficiency in bulk transportation with less environmental impact.

The main characteristics of enclosed belt conveyors include:

- versatile equipment, adaptable to the customer's needs;
- manual take-up stations with screw system; or automatic gravity systems with counterweight (horizontal or

vertical take-up);

- easy-to-disassemble rollers, with no need to move the belt for maintenance;
- entirely enclosed equipment, without exposed moving parts, fully complying with NR-12 Standard;
- ability to adapt firefighting systems upon customer's request; and
- impact rollers are used to control the load at the feed points, increasing the expected operating life of the belt.



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Another important advantage is the ease of operation and maintenance of the equipment.

HIGH CAPACITIES WITH LESS INVESTMENT

Compared with conventional conveyors already on the market, enclosed conveyors for horizontal or inclined paths have several advantages, depending on the characteristics of the site where they are installed. A higher load capacity due to the possibility of increasing the belt speed is one advantage — this differs from conventional conveyors that convey at a lower speed, due to dust generation in the transfer points between equipment.

HIGH CAPACITY ADDED TO LOWER INFRASTRUCTURE COST

Enclosed belt conveyors can be used to

achieve capacities up to 3,500tph (tonnes per hour). Once they are supplied in almost complete modules, they have the advantage of needing less time — and associated costs — for mechanical assembly. Since they do not require external protections, they also offer lower infrastructure costs when installed in tunnels and galleries. Further, they do not require external covers and can be installed directly under local climatic conditions.

SAFETY AND RISK REDUCTION

In enclosed belt conveyors, the conveyor belt is completely enclosed, which prevents any possible product spillage to the environment. All dust that is generated by moving the bulk material remains confined within the conveyor enclosure. To prevent any risk of explosion caused by the dust



contained inside the conveyor, the roller bearings are mounted externally to the conveyor enclosure.

Operational safety is another differential feature of the enclosed conveyor, since all moving parts are assembled within the conveyor enclosed body and it is not possible to access them during the belt conveyor's operation.

EASY DISASSEMBLY AND MAINTENANCE

In terms of maintenance, all components that require periodic inspection are externally mounted with easy access, even when component set replacement is required. If necessary, the inclined rollers (monoblock including type), all components, are easily replaced. The horizontal idlers can also be easily removed at the side of the conveyor structure. The same ease is provided to replace the bottom sliding plates, which can be performed by simply disassembling the bottom of the conveyor structure.

TMSA HAS COMPLETED OVER 1,000 PROJECTS IN 53 YEARS

TMSA is responsible for the construction of the first port soybean loading system in Brazil, in 1972. TMSA develops viable options to optimize the cost-benefit balance in the construction of bulk material loading/unloading systems in port terminals and storage warehouses.

Millions of tonnes of product are stored and conveyed with TMSA equipment, or with equipment that includes some of its components or those of its great partners in almost all of the continents. Since 1966, TMSA's portfolio has included over 1,000 projects.

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Individual approach and gained expertise lie at the core of TTS conveyor building

All equipment manufacturers follow basic rules of mechanical engineering whenever they start to build a conveyor. But what makes TTS stand apart from other conveyor producers — its individual approach and great expertise that it has gained during 27 years of material handling equipment building. What are the challenges involved in developing a product which will operate flawlessly for years for a customer?

It starts with a conversation with a customer where he describes his ideas on how the cargo should be handled. At this point, it is very important to get a precise understanding of the project and shape up a clear vision on how the conveyor should operate on its own or within the system.

It is important to take into account all surrounding and environmental obstacles which can heavily influence the design and performance of the equipment. A visit to the site is very important as small details may not be reflected in the technical task, but might significantly affect the build of the system. TTS's philosophy is to take up as little as possible of its customers' precious time, so they deal with the cargo, while TTS deals with the cargo conveying.

Once all the data is collected, it goes to design stage. While analysing technical and environmental parameters, the best build type is chosen. As a producer, the company manufactures conveyor frames and auxiliary steel elements at its factory using qualified welders and robotic welding units, but besides the steel body, the conveyor has many other elements like rollers, gear motors, bearings, sensors, switches.

All these parts are supplied by TTS's trusted partners — and the crucial element of all this is that a conveyor can



stop because of the malfunction of one small piece, and it can take a considerable time to put it back on line.

Therefore, TTS pays extremely specific attention to the selection of suppliers for its parts, which results in a process of developing a very robust conveyor. Over a long period, TTS has developed a wide net of trusted and reliable partners with which it co-operates, so it can be sure to avoid any failures.

Anti-corrosion treatment recalls to the initial stage when respective parameters prescribe the choice of correct coating type, as well as using of different plastic or composite materials, besides metals.

TTS often perform installation and

commissioning of the equipment produced as it keeps the company in full control of the final stage of the project. Only precisely assembled equipment ensures reliable long-lasting operation of the equipment.

Summarizing the above, the most important advantage of TTS lies in a personal approach to every customer and every project. We never offer equipment "from the shelf", but either update an existing design, or create a completely new one, fitting all the requirements at 100%.

From a technical point of view conveyor is a rather simple machine, but it demands complex analysis of all input parameters resulting in the creation of reliable, robust and long-life systems.



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Bedeschi to supply two Vackem conveyors to Ashdod Port in Israel



As a continuation of its partnership with Ashdod Port in Israel, Bedeschi has signed a new contract with the EPC contractor Lesico for the supply of two conveyors with Vackem technology.

In recent years, Bedeschi has supplied

different equipment for grain handling to Ashdod Port. This equipment includes three eco-hoppers (currently at the commissioning phase) and a continuous ship-unloader (now at purchasing/erection phase). In the complete process flow, the two conveyors will receive grain cargoes from Bedeschi's continuous ship-unloader when it is in operation.

This contract is another great example of Bedeschi's reliability.



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Scorpion Transloaders

The Gold Standard for Bulk Materials Handling Equipment

Cambelt's Scorpion Transloaders are among the most durable and versatile transloaders and feature one of the smallest footprints in the industry. Each model is equipped with Cambelt's unique conveyor system that is perfectly engineered for high speed and high load capacities.

The Scorpion 1210 PCU offers material transfer rates up to 1,325 cubic feet per hour using a 10-hp electric motor. At just under 20-feet centerline load to centerline discharge, Cambelt's 1210 PCU is the industry's most compact rail unloading system. We have designed this unit to center load a 14-foot box truck with options to center load a 16-foot railcar. Using our standard enclosed conveyor system design this unit minimizes material loss and environmental impact. Cambelt's Scorpion 1210 PCU can unload quick in small compact unit.

The Scorpion SP 3015 offers mateiral transfer rates up to 8,500 cubic feet per hour using a 74-hp tier 4 diesel engine. At just under 26-feet centerline load to centerline discharge, Cambelt's SP 3015 requires half of the foot print of alternatives. We have designed this unit to center load a 16-foot railcar; providing 4-wheel steering that rotate 180° with 18-inches of hydraulic lift to provide unparalleled maneuverability for easy operation at all site locations. Using our standard enclosed conveyor system design this unit minimizes material loss and environmental impact. Cambelt's Scorpion SP 3015 sets the bar for the industry in capacity and unloading capability.

Conveyor Belting Systems

Our conveyor belt designs are the result of decades of experience building dry bulk material handling equipment. Cambelt manufactures specialty rubber conveyor belting to meet the challenge of a wide variety of applications. We proudly manufacture all our belts in the USA utilizing our unique and patented one-piece sidewall conveyor belts. Our belt set the standard for durability as we produce the base belt, the sidewall, and the cleat or nubs as a single homogenous belt – no gluing or vulcanizing! Cambelt guarantees that our rugged, one-piece, homogeneously cured products will not delaminate. Whatever the incline, whatever the material, we have the right conveyor belt for the job.

Scorpion Transloader Systems

Cambelt's Scorpion line of transloading conveyors are designed for situations where it is impractical to have fixed conveying system. Our mobile conveyor systems have a low profile inlet requiring only 5-inches of clearance, providing unparalleled access underneath railcars or any tight loading locations. The units are extremely versatile conveyors that can be easily moved between various operating lines and designed to center load railcars so you know you will have the reach to load whatever you through its way. See how Cambelt's industry leading compact conveyors can improve efficiencies at your facility.

High Incline & Closed Conveyor Systems

Cambelt specializes in engineering high incline conveyor systems in straight, L, and Z configurations to meet our customer's site specific requirement. Our systems are environmentally friendly as our conveyors are engineered dust tight, keeping unwanted weather out while mitigating fugitive dusting common on other conveying systems. All our conveyors are designed using our patented belting systems providing industry leading durability while handling material delicately to reduce material degradation seen on comparable systems. All systems are engineered and built in the USA at our manufacturing facilities in Salt Lake City.

Dome Reclaimer Systems

Cambelt's radial reclaimer is a mechanical reclaim system that has been developed to take advantage of the dome's superior volume utilization and structural strength. The reclaiming equipment is designed to allow the dome to be completely filled, burying the reclaim equipment allowing maximum use of the interior for more material to be stored compared to other mechanical reclaim systems. With over 25-years operating experience at 35-storage terminals globally, Cambelt has the experience and expertise to meet your bulk reclaiming needs.

Gallery Conveyor Systems

The CamSpan Gallery is an enclosed, overhead traditional troughing belt conveyor designed to provide extended free span capabilities. This is a fully factory modularized system that can be shipped in sections up to 60-feet significantly reducing onsite construction activities. Cambelt's CamSpan Gallery is designed for spans up to 120-feet with multiple walkway configurations.

Cambelt International Corporation belt conveyor products have been in continuous production since the early 1960's. Our company is successful because our materials handling equipment provides the best value for the money, anywhere. Great people and long term customer relationships are our most important assets. Integrity. Quality. Competence. Stability.



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REPA CE supplies high-quality energy-saving idlers

REPA Conveyor Equipment B.V., based in the Netherlands, specializes in producing high-quality pulleys, idlers and idler frames to customers worldwide. REPA Conveyor Equipment B.V. (REPA CE) is a member of the REPA Group, which has been in belt conveyor business for over 27 years. REPA CE supplies to customers in a variety of industries, such as mining, cement, steel making, agriculture etc.

The supply scope of REPA CE includes:

- pulleys (cylindrical/crowned, ceramic/ rubber/PU lagging);
- steel rollers (DIN, CEMA, SANS etc. standards);
- HDPE rollers;
- carrying and return training idlers;
- idler frames;
- steel structures; and
- custom engineering solutions for bulk material handling.

One particular area that REPA CE focuses on is providing customers with extremely low rotational resistance idlers and at the same time guaranteeing a long service lifetime. The reliability and energy performance of belt conveyors are two major concerns for conveyor users these days. Though idlers may be a low purchase cost for a belt conveyor project at the beginning, they can be one of the main contributors towards excessive downtime, breakage of belts, and high energy consumption. Table I shows the average rotational resistance for idlers that are designed and supplied by REPA CE in accordance with the test requirements of DIN 22112-3: 2010.

High-quality idlers are produced at REPA CE through its engineering and

know-how over 20 years, equipped with high standard components, and world class quality control. The company's idlers have the following characteristics:

- equipped with premium bearings (SKF etc.);
- perfect alignment of bearings;
- strict T.I.R control (according to DIN 22112-2:2010);
- balance class G40/G16 (according to ISO 1940:2005);
- no clearance of bearing in houses;
- no clearance of bearings on shafts in axial and radial directions;
- high quality labyrinth sealing system; and
- high quality coatings (painting/powder coating).

At REPA CE, engineering capability includes tailor-made design in order to select and optimize the best idlers and pulleys for customers' demands according to different environmental applications: from dredging ships to mineral mines, from cement plants to agricultural fields, from trough conveyors to pipe conveyors, from steel rollers to HDPE rollers, from rubber lagging to PU lagging. The engineers can always find the best suitable solution for customers' need. The engineers can select the best pulley/idler diameter, length, bearing size, coating based on their engineering calculations, Finite Element Analysis, and 3D drawing. This provides customers a most cost effective choice of pulleys and idlers.

REPA CE manufacturing capabilities consist of, but are not limited to: a full range of modern CAD machining centres, conventional state of the art horizontal lathes and milling machines, enhanced by

TABLE 1	

Average	rotati	iona	l res	istance
of	REPA	CE i	idler	5

Bearing size	Rotational resistance (N)
6204	1.1
6205	1.2
6305	1.3
6206	1.4
6306	1.8
6307	2.6
6308	2.8
6309	3.7

fully/semi-automatic several idlers production lines. environmentally controlled surface blasting and corrosion protection, which includes "in-house" rubber vulcanization facilities. Supported by a qualified QC department, advanced inspection and test centre, NDT and mechanical/ chemical analysis laboratory in accordance with and certified to ISO 9001:2015 Quality Management Systems/ ISO 14001:2015 Environmental Management Systems/ ISO 18000:2007 Occupational Health & Safety Management Systems. REPA CE is capable of producing approximately 1,200,000 high-quality energy saving idlers annually.

CASE STUDY

Recently REPA CE was awarded a large project which consisted of the supply for pulleys, idlers and idler frames to a Russian port located on the northern coast of Black Sea.

The contract consists of more than 450

pulleys, approximately 100,000 idlers, and 34,000 idler frames. To save the customer's installation time on site, all idlers were pre-assembled with frames and packed in REPA's factory for delivery. In July, 2020, REPA CE together with the REPA Group will move into its new office building situated in Alkmaar which covers an area of 20,000m², with office of 2,000m², area workshop floor of 10,000m², and warehouse floor of 8,000m².







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Using EDEM bulk material simulation for the design & optimization of conveyor transfer equipment



Conveyor transfer systems account for a small percentage of the infrastructure cost of a plant or mine. However, poorlyperforming transfer points are often responsible for significant operational challenges, resulting in unplanned downtime, reduced throughput, and lost productivity. Typical problems that are faced when handling bulk materials include plugging and bridging; abrasion, breakage and dust generation; equipment wear; and below required productivity levels.

This is where bulk material simulation comes into play. EDEM is at the forefront of Discrete Element Method (DEM) technology for bulk material simulation. The company's objective is to help customers handling or processing bulk materials to optimize the design of equipment and machinery to be able to cope with any materials in any operating condition they might face. The company's flagship software EDEM accurately simulates and predicts the behaviour of coal, ores, soils, rocks etc and their interaction with equipment during a range of operation and process conditions.

By integrating EDEM into their design workflow, customers worldwide have been able to optimize equipment design, increase productivity, reduce costs of operations,



Transfer chute redesign at Longking.



shorten product development cycles and drive product innovation.

EDEM offers a unique solution for engineers designing transfer points used in mine operations and minerals processing plants, such as conveyors, chutes, stockpile reclaimers, and material feed and discharge chutes in comminution circuits.

EDEM simulation With technology, engineers can evaluate and verify the design performance of transfer points and chutes. By predicting bulk material flow and interaction with equipment components, EDEM enables design engineers to identify and remedy potential problems in a design, such as material build-up and blockage, flow dispersion, spillage, size segregation, and excessive belt and chute wear before commissioning.

EDEM simulation enables both qualitative and quantitative analysis of transfer chutes designs to explore design scenarios and verify performance. It provides engineers with the insight to make design decisions concerning a range of key areas including:

- prevention of plugging and spillage;
- identification of excessive material velocities and dispersed flow;
- ensuring appropriate delivery of material onto conveyor belts; and
- optimization of wear protection.





constantly clean up; that was his job. Now we don't have a ground man. We haven't shoveled the tail wheel or cleared anything out from under the conveyor since we installed these cleaners. I'm amazed by CleanScrape®, it's been on for a year now and I haven't touched it. This material is sloppy, it's just muck that we're running. And then you look at the return side of the belt and the proof is right there. Absolutely phenomenal. Try it out for yourself, it's amazing.

- Trey Poulson | Fairplay Gold Mine, CO, USA

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Using EDEM simulation technology, companies can improve mine productivity and reduce operation costs by introducing bulk material simulation to verify the performance of equipment prior to manufacture and installation.

EXAMPLE OF PAST PROJECT:

TRANSFER CHUTE REDESIGN AT LONGKING

EDEM was used to evaluate issues of blockage and dust emission with a transfer chute.

The software was used to run simulations of the existing design and identify the flow problems with dry and wet coal. Analysis was conducted to evaluate:

- coal velocity at various locations
- impact velocity on the lower chute and out-going conveyor
- presentation of coal on the out-going conveyor i.e. side loading
- slip velocity between the coal discharging the lower chute and outgoing conveyor i.e. to assess if the coal is softly loading the belt

The data and observations from the EDEM simulations were utilized to commence redesigning the lower section of the chute.

Several design concepts were

developed. To determine which design was optimal, EDEM simulations were conducted to evaluate the performance of each design.

IMPROVEMENTS — THE FINAL DESIGN SHOWS:

- controlled flow in spoon chute;
- soft loading on out-going conveyor to reduce dust emission;
- improved velocity profile on out-going conveyor; and
- improved central loading on out-going conveyor.

In addition a relative wear analysis was conducted in EDEM to examine the normal (impact wear) and tangential (abrasive wear) on the new lower chute. This analysis assisted the Longking engineers to design the wear liner package.

EDEM's ability to accurately simulate the coal flow through a crushing and screening station provided a number of benefits to Longking:

- gained greater insight than using traditional design methods; and
- provided confidence that the design would perform well with low probability of blockages while reducing dust emissions.

In addition EDEM visualization helped Longking demonstrate the design solution

to the client and increase their confidence that the solution would work to solve the issues.

ABOUT EDEM

EDEM is an expert in Discrete Element Method (DEM) technology for bulk and granular material simulation.

First introduced to the market in 2006 by DEM Solutions, Ltd., EDEM software is used for virtual testing of equipment that handles or processes bulk materials in the manufacturing of mining, construction, offhighway and agricultural machinery, as well as in the mining and process industries.

Blue-chip companies around the world use EDEM to optimize equipment design, increase productivity, reduce costs of operations, shorten product development cycles and drive product innovation. In addition, EDEM is used for research at over 300 academic institutions worldwide.

In November 2019, DEM Solutions Ltd. was acquired by Altair, a global technology company providing solutions in product development, high-performance computing and data analytics.

EDEM is now part of the Altair solution portfolio and remains available globally through Altair and a robust network of channel partners.



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Progress in replacement of conveyor belts at coal terminal Rotterdam

N.M. Heilig BV is in the process of delivering new conveyor belt systems to one of Europe's largest and most modern bulk cargo transhipment facilities in Rotterdam, the Netherlands.

This terminal not only transships ores for the German steel producers located in the Rhine and Ruhr-area, but also manages their largest stock of raw materials.

In September 2015, N.M. Heilig BV received the order for the replacement of the conveyors at the quay side as well as conveyor belts in the transshipment fields at the terminal. The order consist of conveyor belt systems with a length of 400-1,300m, with capacities of up to 5,000tph (tonnes per hour). In total, 9km of conveyor belt systems have to be replaced with new systems at this terminal.

N.M. Heilig BV's extensive expertise in the design and manufacturing of conveyor systems contributed to the success of this project. This project includes N.M. Heilig BV's Moveable Discharge Tripper; this create a more dynamic material handling system. This system has the ability to discharge material to other conveyors which are positioned alongside the conveyor; or can continue transport of material to discharge at the head pulley.

Conveyors with a movable head discharge system make it possible to select more than one discharge position of the conveyor. All conveyors are coated with a heavy duty preservation duplex system, which guarantees a long lifetime.





A particularly modern technique created in the design and installation of this project is the long conveyor belt systems in the coal transshipment field, which can operate in original and reversible direction — and an ultra-modern development is the inclusion of belt turnover systems. The belt twist system turns the upper part of the belt downwards at the moment the belt gets to the head pulley of the conveyor system. At the moment the belt arrives back to the tail pulley, the belt is twisted again to the original upper part. This system prevents any risk of material leakage below the conveyor systems and meets safety requirements. This system is interesting at inaccessible areas such as bridges, tunnels or over-passes.

The three phases of this impressive project took place while the terminal remained in full operation, so it was essential to minimize downtime. N.M. Heilig worked efficiently and effectively from the data of the order, and was able to start on-site assembly of the first conveyor only six months after the order date. With a highly motivated large project team of N.M. Heilig BV's own engineers, mechanics and project managers the third phase has been completed. Next phases will be performed from August this year.

ENGINEERING & EQUIPMENT

RBL-REI commissions belt conveying systems

The France-based company RBL-REI is renowned and respected for the design, manufacture and construction of bulk handling systems including overland belt conveyors with technical complexities. The company continues to prove its skills, capabilities and sense of innovation for such challenging works. RBL-REI has recently commissioned two bulk handling systems which includes the same technology innovation on long-distance belt conveyors: a belt deviation system allowing the same belt to change direction without motorization.

A mining company in Poland has entrusted to RBL-REI the design and construction of a 3.5km overland belt conveyor including this specific innovative solution. Originally, due to the narrow corridor available between the quarry and the plant, RBL-REI had to engineer a system including a transfer point, therefore two separate overland belt conveyors, between the origin and the destination of the mineral. However in order to optimize the CAPEX and the co-ordination of stopping time between the two overland belt conveyors, RBL-REI designed a single flight system, meaning the same belt is working upstream and downstream the transfer point.

A belt deviation system without motorization was specially developed for this project in order to unify the two sections. The following benefits are achieved on this specific system: no chute clogging — material highly sticky — as no



stopping time difference between the two sections, and CAPEX optimization by elimination of drives and sub-station at the intermediate transfer point.

This solution has since been applied to a Metro construction project in Milan, Italy. Because of the combination of limited space and time to perform such works in saturated cities, it was decided to use two successive belt deviation systems in order to leave space and therefore anticipate the tunnel arrangement works after the boring phase itself. Indeed two parallel tunnels (A) and (B) had to be bored with two successive phases: the first phase with a 6m-diameter shaft and then a second phase with a 9m-diameter shaft. In order to leave space for the 9m TBM (tunnel boring machine) installation at the future metro station located between the two phases,

and at the same time allow the arrangement of one of the two 6m tunnel sections (arrangement of tunnel A) already bored, two belt deviation systems have been installed into this station. This makes it possible to deviate the belt conveyor coming from the 9m tunnel section (A) to the 6m tunnel section (B). Thanks to the use of this innovative solution, the arrangement works of the 6m-diameter section (A) has been anticipated, so the global construction time has been significantly reduced.

This specific innovation is applicable everywhere long-distance conveying is required, and where saving the cost of construction of an intermediate electrical sub-station is relevant, or in the case of tunnel construction works, anticipate partially tunnel arrangement works.



AUMUND supplies conveying solution for bauxite

This summer AUMUND Fördertechnik GmbH will be supplying an AUMUND arched plate conveyor to Mytilineos S.A. in Agios Nikolaos on the Gulf of Corinth in Greece. This is the location at which the Mytilineos metallurgy and technology group operates a plant which produces aluminium in a two-step process.

After mining and processing the bauxite, **Mytilineos** produces alumina from the enriched ore, which forms the basis for the electrolytic production of metallic aluminium in Agios Nikolaos. The conveying process in the plant consists of discharging bauxite from a silo, and onward transportation to a rod mill by an AUMUND arched plate conveyor type BPB 250-1200.

This is a specialized requirement in terms of both the material and the application. In designing the arched plate conveyor, AUMUND Fördertechnik had to consider among other things the specific material properties of bauxite,

such as abrasiveness, dustiness, angle of repose and also the fact that it can sometimes be sticky.

A major advantage in winning the order was being able to arrange the customer's visit to a cement plant in Volos, where a similar AUMUND arched plate conveyor is in operation.

ABOUT THE AUMUND GROUP

The AUMUND Group is active worldwide. The conveying and storage



specialists has special expertise at its disposal when dealing with bulk materials. With their high degree of individuality, both its technically sophisticated as well as innovative products have contributed to the AUMUND Group today being a market leader in many areas of conveying and storage technology. The manufacturing companies AUMUND Fördertechnik GmbH (Rheinberg, Germany), SCHADE Lagertechnik GmbH (Gelsenkirchen, Germany), SAMSON Materials Handling Ltd. (Ely, England), as well as AUMUND Group Field Service GmbH and AUMUND Logistic GmbH (Rheinberg, Germany) are consolidated under the umbrella of the AUMUND Group. The global conveying and storage technology business is spearheaded through a total of 19 locations in Asia, Europe, North and South America and a total of five warehouses in Germany, USA, Brazil, Hong Kong and Saudi Arabia.

Doppelmayr provides solution to backfill an exhausted quarry

Bardon Hill Quarry near Leicester in Leicestershire is one of the United Kingdom's oldest continuously operated quarries. Aggregate Industries has recently developed a new quarry extension at this strategically important site, extending mineral production for a further 27 years. During the initial 14 years of production, over 12 million cubic metres of overburden material must be progressively extracted. The extracted overburden material will be processed and conveyed for emplacement within the existing exhausted quarry to a depth of 125m.

A road haulage solution is not permitted due to the generation of considerable CO_2 emissions, whilst a conventional conveyor system would have been very costly due to the length and number of transfer points required to navigate the existing quarry haul roads. An innovative and sustainable solution was therefore required to minimize the impact upon local residents, wildlife and the environment.

Other operational constraints included the requirement to minimize the drop height from material discharged into the quarry and to allow continuous operation of the delivery conveyor without compromising the use of heavy mobile equipment to handle and place the delivered overburden.

To address these complex requirements of the client Aggregate Industries, the Austrian company Doppelmayr has developed a novel solution for the backfill system. The proven RopeCon[®] system, a combination of ropeway technology and conventional conveying technology, will span 850m across the entire pit with track ropes. The belt which transports the overburden moves on these steel wire track ropes. The material can be transferred onto a second belt directly in the rope span. This creates a second discharge point at a distance of approximately 100m from the first discharge point. Depending on where the material is needed, either the first or the second discharge point can be used.

To solve the problem of the drop height, a smart concept has been developed which gradually reduces the sag as the backfill progresses. The drop height can thus be

TECHNICAL DETAILS

Section I

Length	470/494m
Difference in elevation	-145/-55m
Conveying capacity	l,000tph
Speed	3.3m/s
Motor rating continuous	-371/-74kW

Section 2

Length	100m
Difference in elevation	0/4.5m
Conveying capacity	1,000tph
Speed	2.6m/s
Motor rating continuous	7/35kW

kept below 45m at all times to minimize the impact from noise and dust during operation of the system.

The contract was signed in March 2019 and the system is due to be operational in December 2020 where it will transport approximately 1,000 tonnes of overburden per operating hour over a distance of 500 metres.



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Safe confined space entry for chutes, silos and hoppers

An estimated 7% of the US fatalities recorded by the Mine Safety and Health Administration (MSHA) between 1995 and 2011 occurred in a confined space. To reduce that number, conveyor operators are wise to understand exactly how a confined space is defined, and to consider what they can do to prevent serious injuries.

Many factors can cause bulk materials to adhere to the sides of chutes, silos and hoppers — including humidity, moisture content, size/texture of the raw material or increased production volume — resulting in lost capacity or clogging. Ongoing accumulation reduces flow and eventually stops production in order to address the issue, causing expensive downtime and requiring extra labour to clear the obstruction.

"Clearing extensive buildup often involves confined space entry, but the consequences of untrained staff entering a chute, silo or hopper can be disastrous, including physical injury, burial and asphyxiation," said Product Engineer Daniel Marshall. "Without proper testing, ventilation and safety measures, entering vessels containing combustible dust could even result in a deadly explosion."

WHAT IS CONFINED SPACE ENTRY?

The Occupational Safety and Health Administration (OSHA) defines "confined space" as an area not designed for continuous employee occupancy and large enough for an employee to enter and perform assigned work, but with limited or restricted means for entry or exit." "Permit-required confined space" means a



confined space that has one or more of the following characteristics:

The vessel contains or has the potential of containing a hazardous atmosphere



such as exposure to explosive dust, flammable gas, vapour, or mist in excess of 10 percent of its lower flammable limit (LFL). Atmospheric oxygen concentration below 19.5% or above 23.5%;

- There is the potential for material to engulf, entrap or asphyxiate an entrant by inwardly converging walls or by a door which slopes downward and tapers to a smaller cross-section; or
- Contains any other recognized serious safety or health hazards.

ENTERING A CONFINED SPACE

Working in confined spaces typically requires:

- special personnel training;
- safety harness and rigging;

[1] Dougherty, Dorothy: "Permit-Required Confined Spaces," Occupational Safety and Health Administration, Department of Labor, Dec. 12, 2011. https://www.osha.gov/pls/oshaweb/ owadisp.show_document?p_id=9797&p_table= STANDARDS



- extensive preparation; and
- added personnel for a 'buddy system'.

"Systems designed to minimize permitrequired confined spaces can provide a significant return on investment, and the best time to reduce the amount of confined-space entry for component maintenance and replacement is during the specification and design stages of a project," Marshall continued. Many manufacturers offer systems and products that can reduce the need for confined space entry. Examples would include:

- modular chute designs with abrasionresistant liners;
- chutes that hinge open and lay down for liner replacement;
- skirtboards with external liners;
- belt cleaners that can be serviced without confined space entry;
- flow aids such as air cannons and vibrators to reduce build-up; and
- modular air cleaners for specific locations rather than centralized dust collection.

GLOBAL REGULATIONS, STANDARDS AND BEST PRACTICES

Rules regarding confined space entry vary greatly depending on the country, even down to the state, province or prefecture level. As always, regional and local codes should be identified and followed, but general rules can be drawn from regulations established in major industrial markets such as Australia/New Zealand, Canada and the United States.² Commonalities between governmental regulations provide employers with a measured approach to safety. These procedures include:

PRIOR TO STARTING THE JOB

- review the permit and the job-specific work procedures;
- gather and inspect all necessary PPE;
- test and/or calibrate any safety gear, test instrumentation or communication tools;
- if a current Job Safety Analysis (JSA) or safety check list does not exist, perform a risk assessment;
- hold a pre-job meeting making sure all workers are aware of the hazards and safe work practices;
- conduct proper tests for toxins, vapour, dust levels, oxygen levels and materialspecific hazards;
- perform as much cleaning and maintenance as possible outside of the vessel;
- post completed confined space entry permit outside of the vessel;
- isolate contaminants and moving parts to prevent the accidental introduction

of materials;

 proper lock-out/tag-out/block-out/testout procedures must be completed and documented prior to entry.

DURING PROCEDURE

- Perform maintenance/cleaning using non-toxic substances such as water and avoid using heat/fire in the confined space. Never use oxygen to purge a confined space, as this can create a fire and explosion hazard.
- Provide ventilation if possible.
- Select personal protective/safety equipment such as safety helmet, gloves, hearing protectors, safety harness and lifeline and breathing apparatus.
- Assign a trained observer to monitor the procedure and internal conditions, and provide escape assistance if needed.
- Practice fast evacuation of the confined space.

CLOSING THOUGHTS: COVERING YOUR ACCESS

"Over time, well-designed access improves safety and saves money," Marshall added. "Safe access that is carefully located and adequately sized will increase dependability and also reduce the downtime and associated labour required for maintenance." He advises that companies consider equipment designs which minimize the need for confined space entry, including improved access doors, vibrators, air cannons or silo cleaning services. "Conveyor systems that are properly outfitted with appropriate cleaning and material discharge equipment create a safer workplace, while experiencing longer life and less downtime," he concluded.



^[2] Swinderman, Marshall & Marti: Foundations for Conveyor Safety, Chapter 18, pp.249-251. https://hubs.ly/H0mLk2t0

Pintsch Bubenzer provides essential conveyor braking systems



Pintsch Bubenzer is focused on the design, production and service of high quality braking systems for both static and dynamic applications which involve the precise control of small to very large amounts of kinetic energy. The challenge is to control that energy in the most efficient, cost-effective way. In the sectors of port, shipbuilding and offshore engineering, utilization of wind, the steel industry and mining, Pintsch Bubenzer is a world leader in braking system design and manufacturing, with safety built into every product.

For many years, the company's commitment to research and development has exceeded the industry average. The many patented products resulting from this effort tell the story. Pintsch Bubenzer is also committed to on-going training of its employees, and expansion of its world-wide sales and service network.

Pintsch Bubenzer supports precise production and installation sites which are fitted out with technically modern equipment and organized in accordance with the latest ergonomic and operational-logistics standards.

The well-thought-out design of all system components and the high and constant quality standards maintained in production, installation and final acceptance ensure smooth and reliable operation, minimum expenditures for maintenance and long service lives.

WORLDWIDE SERVICE TEAM - AVAILABLE 24/7

Whenever Pintsch Bubenzer is needed for service work or repairs to braking equipment, it is available immediately. Its experienced service team will provide the inspection, repair, commissioning and maintenance services required. The company can answer all questions, and work with its customers' staff to clarify specific needs and solutions.

Pintsch Bubenzer offers comprehensive training on its braking systems in its modern training centres, or at its customers' designated facilities. Its brakes perform best when the local maintenance personnel truly understands how the brakes are designed to perform and how and when to do proper checks and maintenance.

The company's technicians are continually updated in both theoretical and practical hands-on training, so that its customers' maintenance personnel learns from professional trainers, getting their hands on the equipment, making proper adjustments and getting answers to any questions they may have.

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Conveying product with Gambarotta's high-capacity bucket elevators

Over the last century, Gambarotta Gschwendt in Italy has developed and manufactured over a thousand bucket elevators to lift a wide range of bulk solid materials, writes Fabrizio Gambarotta Gambarotta Gschwendt.

Thanks to its continuous research and development efforts — and to the quality of its equipment which offers maximum reliability — Gambarotta maintains a good position among the leading manufacturers of bucket elevators.

This article presents one of the series of bucket elevators called ESPLV, which are included in Gambarotta Gschwendt's manufacturing programme.

These are double-chain bucket elevators that represent one of the most modern lines of heavy-duty elevators providing the highest flow rate: 2,000m³/h and higher.

One of the main features is the largesized buckets with a capacity up to 290 litres each on the largest elevators.

The chains are mechanical type with pin and bush, also designed for very high breaking loads (up to 4,000kN).

Thanks to the continuous buckets, bucket elevators from this series have great flexibility, allowing a wide range of speeds from low to high. They are used when a low speed is required (less than 0.7m/sec), as in the case of lifting granular fertilizer material or for lifting medium-sized materials (50–100mm), and also when high speed is possible (>1m/sec) in order to minimize the size — and therefore the cost — of the bucket elevator required.

When speeds lower than 0.8–0.9m/sec are required, the action of discharging the





material, although external to the trajectory of the buckets, occurs due to the combined effect of centrifugal force and gravity, with the material flowing on the back of the preceding bucket, thanks to the continuous bucket system. Therefore, when the material is being discharged, the back of each bucket acts as a 'slide' for that part of the material that is forced to follow a less effective expulsion trajectory due to insufficient centrifugal force. This allows an easy discharge through the outlet chute.

When lifting granular fertilizer, the low speed aims to minimize the crushing of the granules and the level of powdering, mandatory action for guarantee a good product quality.

The low speed also allows the buckets to load (partly with dredging) and lift materials with larger grain size (80-120 mm).

When speeds exceeding Im/sec are permitted (the most frequent case) — usually up to I.5-I.6m/sec — it makes it possible for the highest flow rate of material to be lifted. In this case, the material is usually discharged centrifugally.

About one hundred elevators of this type have already been installed in recent years.

An hydraulic tensioning system is frequently used for tensioning the chains, thus allowing for high loads (if necessary) as well as easy and uniform adjustment of the chains.

The larger bucket elevators are equipped with double drive unit (see picture).

In the cement industry this type of high-capacity bucket elevator is used to lift a wide range of bulk materials such as clinker, raw meal, raw mix, limestone, cement, coal, to name a few.

Recently Gambarotta won an order from Fives FCB for the supply of seven bucket elevators for a new 5,000 tonne per day cement production line in Qatar. In addition to the six, more traditional elevators with oval link chains, the ESPLV 1400 Raw mill outlet elevator stands out with its design flow rate of 1,775m³/h (bucket filling factor 90%) and nominal flow rate of 950m³/h. This elevator is equipped with:

 double drive unit, each keyed on one end of the main shaft, consisting of a bevel-helical

gear unit, a 132kW electric motor and an hydraulic coupling; and

two chains with a breaking strength of 1,500kN each.

Another similar elevator was supplied few years ago to the above-mentioned FCB for Barroso Plant in Brazil.

An order for conveying and lifting machines was finalized recently with BUZZI UNICEM for the APZ2 Line of its Mexican subsidiary Cementos Moctezuma. This order includes two ESPLV bucket elevators for recycling material from the Horomill mills; one for the raw material and one for the fired material.

Since 1998, Buzzi Unicem company has selected ESPLV as recycling bucket elevators for the Horomill mills installed in its cement works.





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Agudio: rope-hauled systems for material transportation since 1861

In the world of rope-hauled transport systems, few projects can be replicated because different material and working conditions require customized design and construction solutions.

In its Turin-based headquarters, a team of engineers works on the development of unconventional rope-hauled transport systems: ropeways, Flyingbelt, cable cranes, cableways and funicular for material transportation.

Agudio is now part of an international group together with companies such as Leitner ropeways, POMA, Prinoth, Leitwind, Demaclenko and MiniMetro. Over 60 branches all over the world, more than 3,300 employees and an annual turnover amounting to over €850 million.

Today, as result of the several projects successfully implemented, Agudio is a respected brand in the design and construction of ropeways and Flyingbelts for material transportation in difficult environmental conditions, the most cost-effective solution to reduce distances, overcome obstacles such as valleys and rivers, or fly over forests and



protected areas with almost no environmental impact.

Agudio Flyingbelt — technology with no barriers

CEMENT PLANTS, MINING, PORTS

The Flyingbelt is a patented system combining the advantages of conveyor belts

and rope-hauled systems into a unique product for its efficiency and reliability, ideal for the mining, extraction and cement fields, as well as big construction sites.

As the Flyingbelt is not affected by the soil morphological conditions, it can be used in any context, with a considerable reduction in the costs resulting from civil

Benefits of using Agudio systems

- Innovation: the design of Agudio material transportation systems combines over 150 years of expertise in this sector with the investments in R&D for the creation of innovative transport systems like the Flyingbelt.
- Low energy consumption: rope-hauled systems for material transportation can carry materials for long distances, exclusively by means of electric motors. Energy consumption (or generation) only depends on the system features and type (one- or two-way), but anyway it is lower than road haulage systems.
- Low CO₂ emissions: rope-hauled systems for materials transportation do not generation CO₂ directly as these systems are powered by highly efficient electric motors whose CO₂ equivalent emissions are lower than the transport systems using directly fossil fuels, with savings up to 90%.
- Low maintenance costs: the maintenance costs of a rope-hauled system for material transportation designed by Agudio are extremely low, due to the use of standard components, but very reliable and of high quality, as well as programmed maintenance plans, which can be carried out directly by the system operating personnel.
- High level of automation: rope-hauled systems for material transportation are designed with a high level of automation to ensure the constant system control and operations and to synchronize the material loading and unloading systems with the line speed.
- Long system working life: rope-hauled systems for materials transportation are designed according to the most advanced guidelines and the expertise gained by Agudio in over 150 years of design, construction and maintenance of such systems which, nowadays, can reach up to over 40 years of working life, thanks to the suitably programmed maintenance plans.
- Safe and reliable systems: as a result of the high automation level and the component quality, rope-hauled systems for material transportation can ensure the highest levels of safety and reliability, thus offering a top performance and minimizing material transport specific costs.
- Low dispersion of dust particles: rope-hauled systems for materials transportation can be designed with specific dust particle containment systems, according to the type of materials, in order to minimize dust dispersion in the air during loading and unloading operations, as well as along the line.
- System operation regardless of weather conditions: rope-hauled systems for material transportation are designed according to the experience gained in the design of systems for the transport of people in the mountains, and therefore subject to difficult weather conditions in terms of temperature and wind. For this reason, their safe operation is guaranteed also in unfavourable weather conditions.

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works, excavations and supporting structures usually required by conventional transport systems.

The adoption of standard components

used also for traditional conveyor belts enables the Flyingbelt to be a highly innovative system, but at the same time, ordinary for its operating and maintenance methods and costs.

Moreover, the Flyingbelt can be used for hybrid systems, where the same belt can run both hanging on ropes and on





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traditional supports laying on the ground.

AGUDIO ROPEWAYS — THE EVOLUTION OF **SPECIES**

Ropeways have always been the most costeffective, rational and environmentally friendly solution to transport materials over long distances, steep slopes or poorly accessible areas.

Nowadays, Agudio ropeways represent the highest expression of this sector technology, with completely automated systems, which do not need personnel for material loading and unloading operations and can guarantee a high-level performance. They represent an ideal solution for new installations or revamping of existing ones.

AGUDIO CABLECRANES — PERFORMANCE AND INNOVATION

DAMS, QUARRIES, VIADUCTS.

It is where the other means of transport cannot reach that Agudio technology shows its superiority.

Agudio cablecranes are designed with a double track rope having reduced diameter, easier and faster to be installed and more stable during operation, also in adverse

climate conditions.

Agudio cablecranes, with loading capacities of up to 50 tonnes, traverse speed up to 8m/s and lifting speeds up to 4m/s, reflect the state of the art in this technological sector and make it possible to manage complex sites in a simple and advanced manner, with considerable advantages in terms of implementation costs and timing..

The year 2018 has been an active one for Agudio, due to the start of important construction sites around the world. These include:

- in Germany: a 500m-long Flyingbelt for the transport of 400 tonnes of aggregates now flying over the Lippe River, north of Düsseldorf.
- * in Portugal: two radial cablecranes of 28 tonnes of useful capacity (385 metres of span and 160 metres of lowering of the hook) for the construction of the dam of Daivoes, in the hydroelectric complex of the Tamega River.
- * in Portugal: two parallel cablecranes of 28 tonnes of useful capacity (620 metres of span and 200 metres of lowering of the hook) for the construction of the dam of Alto Tamega, again in the

hydroelectric complex of the Tamega River.

in Ethiopia: the repositioning of the radial cablecrane used for the constructions of the Gibe III's dam to the new construction site for the Koysha's dam. The cablecrane has been revised and upgraded to achieve a transport capacity of 35 tonnes.

Furthermore, at the end of 2018, a new contract was signed with a major international cement plant manufacturer for the supply of a Flyingbelt in Brazil, the second one in this country. The suspended conveyor belt will connect the cement factory in a straight line with the new limestone quarry, crossing a wide valley with a span over of 800 metres, reducing the transport distance from 9km (road) just to 1.7km.

The projects in the portfolio represent important feedback from main players in cement, mining and construction sectors, which continue to recognize in Agudio a reliable partner able to offer innovative, safe and customized solutions, with low environmental impact and significant cost reductions in material transport systems.



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AUMUND supplies conveying technology for the largest sugar silo in the world

Conveying technology from AUMUND is now also in demand within the Dubai-based Group, Al Khaleej Sugar, one of the largest sugar producers in the world. The first order is from its Egyptian subsidiary, Canal Sugar, for a CENTREX® discharge system and two AUMUND bucket apron conveyors. Intense negotiations between the Al Khaleej Sugar Group and the AUMUND Fördertechnik GmbH Branch Office in Dubai led to the award of the order. The two AUMUND bucket apron conveyors will be fabricated in stainless steel. All of the equipment will be on site before the end of this year.

Canal Sugar is constructing a new sugar production plant near Beni Suef.

It is the largest agro-industrial project in Egypt since 1952. The Canal Sugar Refinery will be able to process 5.4 million tonnes of sugar beet per season.

AUMUND Fördertechnik

already supplied the CENTREX® discharge system type CTX 8000, which has a diameter of 8m, in March this year.

The CENTREX is in ATEX (explosion proof) design and will be installed in a silo which extends approximately 65m underground.

The silo holds around 400,000 tonnes of



refined sugar and is therefore the largest of its kind in the world. The discharge capacity of the CENTREX[®] is up to 300tph (tonnes per hour) of sugar, which will be transported onwards to the packing plant by the AUMUND bucket apron conveyor type BZB 1400/400. The BZB is approximately 145m long with a vertical lift of about 103m. The second AUMUND bucket apron conveyor ordered by Canal Sugar is of the type BZB 1600/400 and has a capacity of up to 400tph. It will operate as a collecting conveyor under the sugar centrifuges.

ABOUT THE AUMUND GROUP

The AUMUND Group is active worldwide. The conveying and storage specialists has special expertise at its disposal when dealing with bulk materials. With their high degree of individuality, both its technically sophisticated as well as innovative products have contributed to the AUMUND Group today being a market leader in many areas of conveying and storage technology. The manufacturing companies AUMUND Fördertechnik GmbH (Rheinberg, Germany), SCHADE Lagertechnik GmbH (Gelsenkirchen, Germany), SAMSON Materials Handling Ltd. (Ely, England), as well as AUMUND Group Field Service GmbH and AUMUND Logistic

GmbH (Rheinberg, Germany) are consolidated under the umbrella of the AUMUND Group. The global conveying and storage technology business is spearheaded through a total of 19 locations in Asia, Europe, North and South America and a total of five warehouses in Germany, USA, Brazil, Hong Kong and Saudi Arabia. DCt

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Power plant opts for VIGAN

to unload wood pellets



The vast majority of VIGAN equipment installed worldwide is used for the bulk handling of seeds and cereals (with densities of up to 0.75kg/m³).

The company's machines have gained wide acceptance thanks to their ability to convey this type of cargo efficiently, as far as performance, energy consumption, hold cleaning, safety and environment are concerned.

However, VIGAN's pneumatic unloading machines are not limited to grain handling. They are also suitable for conveying all types of cereals, beans, seeds and most of the raw materials used for animal feeding, as well as delicate cargoes (including malt, rice and cocoa bean). They are also ideal for many other products including chemicals, slightly compacting products such as soy bean meal (SBM) and DDGS. For over ten years, VIGAN has proven to be a reliable partner of choice for the unloading of wood pellets.

Cargo to be unloaded pneumatically is generally free flowing. The natural angle of repose is usually around 30°: the particle size and physical form must allow this freeflowing nature, for an easy separation of the transporting air and the product in the receiving hopper.

WOOD PELLET HANDLING

Wood pellet is a solid fuel produced by crushing and densifying waste timber like sawdust, forestry residues and wastes, but also industrial byproducts like old paper.

The transport of any kind of wood residue is problematic, due to the low density of this kind of material. Therefore, the most common process is pelletizing in order to compact the material into granules (usually about 10–15mm in length



and with a 5-6mm diameter).

Thanks to this process, and with a minimal humidity content, the wood pellets have good free-flowing properties and therefore allow smooth transport from the production facility up to the customer's site.

VIGAN's NIV-type pneumatic ship unloader is ideal for the handling of wood

pellets and enjoys numerous advantages, such as:

- high unloading rates;
- a high level of safety in accordance with the required standards;
- dust-free unloading (less than 10mg/m³);
 no spillage;
- minimal breakage; and
- Iow weight.

VIGAN CASE STUDIES

Europe is a massive pellet consumer and its local large production sources are still not sufficient. Therefore, Europe is also the largest pellet importer in the world. The imported pellets are mainly sourced from North America and European countries outside the EU27.

A co-firing power plant produces more





ecological energy with wood pellets.

New power plants, as well as existing energy producers, are upgrading their existing facilities with the latest innovations in order to fulfill their legal requirements of protecting the environment while containing costs.

In 2009, VIGAN supplied a NIV-type pneumatic ship-unloader for wood pellet unloading with a capacity of 600m³/h to ELECTRABEL (GDF SUEZ group) in Nijmegen, The Netherlands.

The 585MW co-firing power plant (coal + biomass) was therefore able to increase by around tenfold its incorporation of wood pellets, resulting in 20 % of the total energy produced by this renewable energy source.

Wood pellets were transported to GDF SUEZ plant by vessels from various origins (namely from Canada), thanks to the excellent hinterland river and canal network in the Netherlands for bulk transport.

In 2011, VIGAN supplied two NIV-type pneumatic unloaders for wood pellet unloading at a capacity of 600tph (tonnes per hour) to RWE in Tilbury (United Kingdom).

The 100% biomass power plant (wood pellets: 750MW), was the biggest biomass generating site in the world at that time: 2.5 million tonnes of wood pellets were unloaded per year from Panamax vessels



(60% import from Canada).

In 2015, RWE built an ultramodern coalfired power plant in Eemshaven (the Netherlands). The plant plays an important role in supplying the Netherlands with affordable and reliable electricity.

In order to modify the existing coalfired power plant to allow for the use of biomass (wood pellets), in 2018 VIGAN supplied a NIV-type pneumatic unloading equipment with a capacity of 600m³/h for the unloading of wood pellet from coasters.

The co-firing plant of 1,560MW, now 50/50 coal - wood pellets, currently accounts for $\pm 20\%$ of renewable energy production for the Netherlands, and is to be upgraded to 100% biomass plant.

In 2019, VIGAN supplied a NIV pneumatic ship-unloader, with a capacity of $600 \text{ m}^3/\text{h}$, to RWE in Amer/Geertruidenberg (the Netherlands) for the unloading of wood pellet from barges.

Different fuels are being used in the

Amer power plant, the main types being hard coal and biomass. To enable processing of the wood pellets, the power plant has a special biomass unloading quay, with facilities for storing biomass in different silos. The 1,245MW power plant has chosen VIGAN for its capacity increase and for the upgrade of the existing installation, in order to switch from 40% to 80% biomass (coal/wood pellets).

ADAPTED TECHNICAL SOLUTIONS

During transportation to the plant, wood pellets can easily break thereby causing dust and dust emissions.

Power plants are usually very cautious and strict when it comes to safety and quality.

VIGAN therefore adapts its machine design to the specific site and customer requirements, as far as dust and explosion protection, noise insulation and product breakage are concerned.

DUST AND EXPLOSION PROTECTION

Proper procedures are taken into consideration on-site by the power plant in order to obey to specific rules when working with potential explosive atmosphere: ATEX tools/equipment, cleaning procedures, monitoring of product temperature and moisture inside the ship prior to unloading operation, smoking restriction, etc.



In addition to this, VIGAN manages the explosion risk on its machines depending on risk analysis and site rules, and adequate preventative measures are in accordance with the potential explosive atmosphere identified, like the following ones taken at Eemshaven:

- Equipment selection: electrical equipment is selected depending on the explosive atmosphere zone and the product explosive properties. In-house equipment is subject to an Ignition Hazard Assessment.
- Earth bounding: to avoid static discharge build-up, the complete machine is earthed and all main structural components are earthed together to ensure a safe equipotential of the machine.
- Dust filter: due to involved process speeds and volumes, the potential explosion area in operation is the VIGAN dust filter. In order to remove the possibility of blowing away objects due to an explosion, the filter is protected by explosion panels to protect its structural integrity. The explosion panels are directed in a safe area to avoid additional hazards and equipped with opening detection to act as an emergency stop on the machine. Antistatic filter sleeves are used for both the main filter and the secondary loading filter.
- Explosion propagation: to prevent dust explosion propagation, the explosion is detected before the explosion panel

opening with a pressure sensor in the filter. When an explosion is detected, fast insulation bottles are set to isolate the explosion in the filter and avoid propagation of a flame through the unloading pipes (inlet) or the loading chute (outlet).

Emergency stop: the complete system is controlled by a STUVEX control unit triggering an emergency stop of the machine. The emergency stop will also remove power supply on the equipment thereby immediately stopping the airlock. The airlock, with its pressureresistant design and tight air gap, will also act as a fire propagation stop.

Another specificity of VIGAN pneumatic equipment is the bearings of the rotary lock (the rotation speed of the rotary lock is low, less risk of heating, etc.): they are located outside the areas at risk of explosion, contrary to mechanical screw-type unloaders where the bearings are buried in the material, causing hot spots that are more likely to cause explosions.

NOISE INSULATION

Power plants generally have specific noise level requirements. VIGAN noise insulation namely consists of:

- complete machine room insulation with perforated plates and roof insulation;
- turbo blower with silencer at both inlet and outlet;
- ✤ acoustic baffle at the ventilation inlet

and outlet of the machine room; and

horizontal pipe, elbow and vertical fixed part of the vertical pipe are acoustically insulated with high-density rockwool.

MINIMAL PRODUCT BREAKAGE

By optimizing the air and product speed in the pipes, VIGAN pneumatic continuous ship-unloaders cause very low — to no product breakage.

Recently, tests have been performed at NORD CEREALES in Dunkirk (France). The company namely uses VIGAN machines for the unloading of around 100,000 tonnes of wood pellets per year.

Measurements made by an independent body confirmed an insignificant increase in the fine dust rate after the handling of wood pellets by VIGAN type NIV 600 pneumatic ship-unloader (before NIV: 0.9% — after NIV: 1%).

Like NORD CEREALES, other VIGAN customers are using their pneumatic unloading machines for the handling of wood pellets, even if they were originally designed for grain.

The use of VIGAN unloaders for wood pellets is in no way a coincidence. It should be noted that the characteristics of wood pellets are similar to animal feed pellets. VIGAN already has long-lasting expertise with this kind of product, e.g. through a pneumatic ship-unloader installed at GRANOVIT (former Provimi – part of CARGILL group) in Kaiseraugst (Switzerland).

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Handling grains, cereals and fertilizers

why customized handling systems are so important



GEA's grain equipment: backed by over 90 years of experience

GEA expertise in grain handling derives from the acquisition of Golfetto Sangati, an Italian company that dates back to 1921. It is involved in designing, building and installing complete plants for grain handling and milling.

GEA develops, builds and installs turnkey plants for durum and wheat mills, maize mills and rice mills. It also provides a wide range of shiploading and unloading systems, and storage facilities for raw materials and finished products.

The acquisition of strong Italian company Golfetto Sangati enhances the technologies for the handling, cleaning, calibration, selection and storage of seeds and other free-flowing or not free-flowing commodities such as wheat, corn, barley, soybean, sunflower seeds, rapeseed, coffee, rice, soy meal and other similar products. GEA designs and manufactures four main type of plants:

- shiploaders: up to 2,000tph (tonnes per hour); fixed or mobile on rails or tyres;
- ship-unloaders: pneumatic unloaders up to 300tph/mechanical unloaders up to 1,500tph, fixed or mobile on rails or tyres;
- strain and fertilizer terminals:

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including conveyors (chain conveyors, bucket elevators, belt conveyors, scales,...), cleaning and selecting equipment; and

special equipment: a combination of shiploading/ ship-unloading plants or equipment with very specific, customized, nonstandard design.

GEA has a wide and complete range of technical solutions, so that it can offer a proper partnership from the very early project development phase.

The company's approach is very much appreciated by the clients, who know, from the beginning, that they are getting an optimized solution — this approach is key to GEA's ability to stay competitive in

the market. In terms of recent contracts, GEA has produced 2,000tph high-capacity shiploaders, 600tph mechanical shipunloaders, and combined shiploading/ unloading equipment. It has also been heavily involved in the upgrade of grain and fertilizer terminals.

From a technological point of view, GEA is focusing on reducing the total cost of ownership. It is doing so by reducing



energy consumption of its equipment, as well as optimizing anti-collision safety systems for shiploading and unloading equipment during operations.

GEA EXPERTISE

GEA can offer its clients extensive expertise in the design and engineering of integrated technologies lines for grains, flours, grain-based food and fertilizers. This expertise, together with decades of experience in grain handling and milling, is fundamental in enabling the company to propose the most suitable solution in terms of best technology and of optimized investment profitability, considering the input and the output required by the client for the construction of loading/unloading plants and full grain and fertilizer handling terminals.





Mechanical and Pneumatic Systems for grain handling and port facilities

Designed, engineered and built in italy with 90 years of experience and evolution

Golfetto Sangati, **part of GEA Group**, designs, builds and installs turnkey **equipment** for grain handling and milling. The company fulfills the market demand in a competitive way **and with state-of-the art technologies** based on research, **experience and in-depth techn**ical knowledge. The company designed and built more than 60 port systems all over the world and plays a primary role in technological advancement from the first pneumatic ship unloader to the more advanced mechanical loaders and unloaders. The company supplies a large range of handling, processing and storage, loading and unloading systems on tires or rail



golfettosangati.com gea.com

New Bruks Siwertell port unloader sets standards in the grain industry

For customers looking for a highly agile, extremely efficient, port-mobile system that can champion the performance of a pneumatic unloader, Bruks Siwertell has six compelling reasons to choose its new portmobile unloader.

Investing in any new technology is a major decision. Most importantly, bulk handling equipment owners want it to meet their operational needs; they, as in any other business, want maximum return on investment, the highest efficiency, and the lowest running and maintenance costs. They also want to know that their choice of investment presents the very best of what the market can offer. Every new investment should be scrutinized against these expectations, but not every new technology will deliver them.

Margins are tight, especially for grainhandling operators having to respond to variable import quantities, or for those whose import volumes do not justify the economies of scale delivered by large, fixed unloading installations. For this reason, Bruks Siwertell has developed the portmobile unloader. Available in two sizes, a 400tph (tonnes per hour) and a 600tph version, the unloader range serves vessels up to 60,000dwt. Here are six good reasons why operators should be considering them.

REASON 1: OUTSTANDING FLEXIBILITY

The new port-mobile unloader offers unmatched flexibility and has been optimized for use in ports. The weight and dimensions of its steel chassis has been minimized so that it has a lightweight and small footprint, ensuring that it takes up as little precious space on the working quay as possible or when it is stowed between jobs.

It is equipped with a self-propelled rubber-tyre system and an advanced steering solution for full, easy manoeuvrability between operations. Its movements are operated manually or by using any of the pre-programmed driving modes and can travel straight ahead, in reverse or diagonally, both to the left and to the right. It is also able to smoothly rotate up to 30° both left and right.

When stationary, the end pairs of axles, both on the sea-facing and land-facing sides, are turned by 90° to secure the gantry in all directions when parked. During operations, the port-mobile unloader is supported by hydraulic jacks for increased stability.

The port-mobile unloader inherits benefits common to all Siwertell screwtype unloaders. One of these is the flexibility to handle many different types of cargo with a single machine, and without modification. As a result, the port-mobile unloader is not limited in the types of cargo to be handled. Unlike pneumatic systems, which are only suitable for fine grains, Siwertell machines can gently and efficiently handle all manner of grains as well as larger soya beans and feedstuffs.

REASON 2: IMPRESSIVE EFFICIENCY AND ENVIRONMENTAL PROTECTION

High through-ship efficiency and therefore fast port-turnarounds was a key development driver for the port-mobile unloader. The result, the through-ship efficiency of a port-mobile unloader is better than that of a pneumatic system. In part, this is ensured by how the unloader operates within a ship's hold.

Unlike a pneumatic unloader, which can only operate its intake nozzle in a vertical direction, the Siwertell port-mobile unloader can move its vertical arm $\pm 30^{\circ}$ and reach all areas of the cargo hold, including the troublesome area underneath the hatch corners. This maximizes efficiency rates and minimizes any cargo left for the payloader at the end of the unloading operation, ultimately improving through-ship speed.

Even where the finest grains are concerned, the port-mobile unloader offers the best environmental protection on the market. It has a totally-enclosed conveying



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NEW Port-mobile unloader delivers a competitive edge

Our new Siwertell port-mobile unloader offers unrivalled rewards. Grain handlers can benefit from the highest average efficiency rates on the market, extremely low cargo degradation rates, quick truck-filling times, close to zero dust emissions and rapid switches between all kinds of grain cargoes including soya been. Quickly stowed and deployed, the new unloader is an agile asset for any port.

- Ship unloading
- Ship loading
- Conveying
- Stacking & Reclaming
- Truck unloading
- Chipping

- Milling
- Screening
- Wood residue processing





line to eliminate dust emissions and as its vertical intake nozzle is submerged in the cargo, dust creation from cargo avalanches is completely avoided.

The port-mobile unloader is also extremely efficient to run. It uses the latest diesel engine specifications and these also meet the strictest environmental regulations on exhaust and noise emissions.

REASON 3: UNBROKEN CARGO FLOWS

Any interruption to the flow of material negatively impacts efficiency. The portmobile unloader has a dual truck-loading system, with an option for a third, which is able to deliver continuous, uninterrupted discharge operations as long as there are trucks available.

The truck-loading systems operate independently of one another to deliver the fastest discharge times possible. To reduce the impact of truck changeovers, and to allow enough time to position the truck correctly, the unloader is equipped with a large-volume intermediate surge hopper.

Also designed to minimize any cargo flow interruptions, a separate fuel tank, including an automatic fuel-replenishment system, is incorporated into the unloader.

REASON 4: PROFITS FROM GENTLE HANDLING

One of the greatest advantages of unloading grain with screw-conveyor technology is the low degradation rates of the material. A low conveying velocity and a gap between the screw and the casing prevents the kernels becoming crushed during unloading.

Siwertell unloaders therefore avoid the cargo degradation concerns that traditionally accompany the high-conveying velocities of pneumatic unloaders, but maintain equivalent throughputs.

Cargo degradation is a concern for many commodities, but within grain handling it can really impact profits. If not handled gently, grain cargo breaks-down, this causes the production of fines, which are powdery particles. These fines can pose some significant financial and safety concerns.

They can mean that the whole grain shipment is downgraded as fines make it more difficult to aerate the grain, which increases spoilage rates. They also have to be removed before milling; therefore their presence has a significant knock-on effect on grain processing as a whole. Furthermore, the greater the number of fines produced, the greater the dust emissions, raising the risk of fire and explosion in storage silos and other confined areas.

Siwertell's claims for extremely low material degradation rates have been independently validated many times over decades, both by Siwertell customers and by third-party inspectors, using comprehensive testing regimes and measurements before and after unloading.

REASON 5: LOWEST TOTAL COST OF OWNERSHIP

The port-mobile unloader offers an extremely competitive total cost of ownership. From the outset, it has a very lightweight design, which avoids any costly infrastructure or preparatory quay-reinforcement work.

In terms of operational costs, these, in part, depend on total unloading times and therefore it is important to maintain high average through-ship capacities. This also reduces any demurrage costs. The portmobile unloader achieves these high through-ship capacities with its continuous material handling rates and superior reach into a ship's holds. The new port-mobile unloader shares the tried-and-tested technology of other Siwertell grain-handling units and uses simplified, standardized technology, which keeps maintenance and wear parts costs relatively low compared with other unloading systems on the market.

Its robust, simple mechanics also translate into very low maintenance costs, especially in comparison to the highintensity demands placed on a pneumatic system's key components. This is because the continuous low-velocity motion of the counter-rotating screw places little strain on working components. Unplanned downtime is brought to a minimum, and predictable forces within the unloader make it possible to accurately plan for maintenance intervals and the timely replacement of wear parts.

REASON 6: EXCEPTIONAL SUPPORT

The fundamental aim of Bruks Siwertell's service work is to ensure that its customers have a safe, efficient dry bulk handling system that they can rely on, but key to this service is the bridge that Siwertell builds with its customers, dedicating a specific member of staff for each and every customer. It believes that this, along with good teamwork, assures its customers that they can rely on Siwertell.

These dedicated connections are backed-up by expertise and resources. Experienced personnel, with excellent technological knowledge, are behind its commitment to customer care. This experience delivers many benefits to a customer.

For example, during a service or inspection, a surveyor can rapidly assess a system and quickly determine its condition. It also means that Siwertell is often able to assist with temporary repairs, which can keep a machine up and running until new spare parts arrive.

> Bruks Siwertell's lifetime customer commitment is delivered through a global service network offering on-demand and emergency support and planned service agreements. Bruks Siwertell believes that customers should not only benefit from the advantages that their Siwertell unit offers today, but continue to do so in the years to come.

> It is possible to try out a virtual reality environment for the portmobile unloader and see how these capabilities could deliver significant benefits to grain-handling operations.









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ELECTROMAGNETIC PARKING BRAKE	2x200 Nm	
ELECTRIC STEERING MOTOR	2x4 kW 400V AC	
STEERING GEARBOX RATIO	1:178	
PINION/CROWN RATIO	1:8.57	
TOTAL STEERING RATIO	1:1526	
MAX STEERING OUTPUT PEAK TORQUE	2x5.000 Nm	
TIRE	Pneumatic 16.00-25	
TILTING ANGLE	±6°	
LIFTING CYLINDER	Bore Ø140mm. Rod Ø90mm	
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Following quarantine requirements in grain processing facilities



Quarantine for imported agricultural products, grain in particular, is a worldwide measure to protect countries from harmful pests and diseases. Each country has its own biosecurity requirements and the responsibilities for importing goods.

Accounting for around 21% (\$12.8 billion) of the total gross value of farm production, the grain industry in Australia makes an important contribution to the Australian economy, but still relies on imported grain. Importing grain to Australia is a commercial decision between an importer in Australia and a supplier in the country of origin whose obligation is to meet Australia's import conditions.

To address risk associated with imported grain, the quarantine measures apply. Australian Quarantine and Inspection Services (AQIS) subject imported grain to strict quarantine conditions. During the quarantine processing grain by hammer milling and steam palletization is an effective way to kill pathogens and arthropod pests, and devitalizes the grain and weed seeds to prevent germination. Not only processing grain is important in protecting the environment, but de-dusting measures are effective.

The special focus has to be on dedusting of the personnel clothes for those, working on grain processing in quarantine zones. Using clothes cleaning technology can maximize the efficiency of the very process and minimize the risk of dust build up.

MIDECO'S GLOBALLY RECOGNIZED BAT BOOTH[®], PERSONNEL CLEANING SYSTEM

Following the requirement for employees' cloths to be properly cleaned from dust, Mideco comes up with a unique, simple to use and smart clothes cleaning technology — Bat Booth® that is specifically designed to eliminate any type of dry dust. On top of being highly effective in industrial minerals processing, silica processing, copper smelting operations and powder coating processes in quarries and at cement processing plants, Bat Booth® has a great value for agricultural quarantine applications for employees after leaving the grain quarantine zone. The Mideco de-dusting booth uses compressed air to safely clean the contaminated clothing. This quick, safe and effective clothes-cleaning method from Mideco allows workers at various processing operations to clean their dust soiled clothing and removes 50% more dust than the commonly used single point air hose method.

In 2019 Bat Booth® was recognized by NIOSH — the US federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and diseases, as the cleaning booth technology that reduces the worker's respirable dust





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1800 Series E-Crane 42m outreach and lifting 22 tons @30m Outperforms the world's biggest material handlers



exposure peaks by approximately 88% in seconds.

Out of many exiting technological ways to remove dust from personnel uniforms, Bat Booth® is specifically designed in accordance with NIOSH concept of safe and efficient clothes cleaning system using compressed air at 30psig to remove dust from work clothing.

Bat Booth® was included in NIOSH Dust Control Handbook for Industrial Minerals and Processing and recommended as an effective clothes cleaning technology. Mideco, in its turn, is mentioned as the commercial manufacturer, which made its design.

Bat Booth® system is UL certified. That means they are evaluated and tested for

safety risks by Underwriters Laboratories — one of the most reliable safety certification companies in the world.

CASE STUDY

A unique but perfect application for Mideco's Bat Booth® has been found at the facility of an Australian grain processing leader, New South Wales, Australia. There Mideco's award-winning personnel dedusting device is helping the company meet Australia's strict grain import laws.

An Australian family-owned diverse agribusiness with over 65 years of experience bringing the finest Australian food and industrial products to the world.

The company also imports grain and has

to comply with Australia's tough import laws. Overseas grain may potentially carry bacteria or germs that can harm humans, animals, crops and land, thus presenting a high biosecurity risk.

Therefore, imported grain must be kept in guarantine for a certain amount of time. Upon delivery, imported grain is placed at one of the company factories in an enclosed space. The difficulty is ensuring that staff that works in that area don't carry any grain or grain dust out upon exiting.

Up until now, the workers have been using disposable uniforms to ensure the conditions of quarantine are met. This was not the most effective, comfortable or sustainable way to work. The installation of Bat Booth[®] has solved that problem with ease

Comparing to the most common ways of cleaning staff's uniforms that often simply dislodge the dust, Bat Booth® permanently removes and captures the dust particles with the help of powerful HEPA filters. Workers can use Bat Booth® when required, sometimes several times a day, as it only takes seconds. Now staff on site can rest assured no speck of grain dust will escape the guarantined area.

This is Bat Booth's® debut in the grain industry. Mideco is excited to have found a new application for the dust control product it are really proud of, and is looking forward to creating new partnerships in this space, since there's a global practice to keep local habitat safe.



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MOBILE HARBOUR CRANE

Rotainer MH42

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MATERIALS HANDLER

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Strong customer focus helps AGI serve the grain market efficiently

AGI is a major provider of equipment solutions for agriculture bulk commodities including seed, fertilizer, grain, feed and food processing systems. It partners with its customers across six continents to deliver the AGI advantage by engineering unique, market-specific solutions. AGI offers fullsystem solutions through its catalogues of seven components that include: storage, handling, processing, technology, structures, engineering and project management.

AGI has been manufacturing conveying solutions for farm and commercial applications for decades, and through its extensive handling catalogue, it is able to work with its customers to create a solution specific for their conveying needs. There are many contributing factors to finding the right solution for a customer, both the bulk product properties and the conveyor properties need to be considered to find the right conveyor for the project. AGI works with its customers to find a solution specific for their conveying needs. With an extensive catalogue of conveyors ranging from enclosed belt conveyors, open belts, air supported belts, en-mass chain conveyors, bulk flow chain conveyors and screw conveyors — AGI is able to supply the appropriate solution for the bulk commodity.

AGI's Hi Roller Enclosed Belt Conveyors are optimal for dry bulk products, like grains, pulses and feeds that have low moisture levels or products that require gentle handling. The enclosed belt conveyors deliver a high capacity with less power, saving customers on their annual operating costs. AGI has installed Hi Roller enclosed belt conveyors in port terminals around the world, including a terminal by the Black Sea in Russia with 800 tonne per



hour capacity — along with AGI Union Iron and AGI Tramco's, bucket elevators, and chain conveyors.

What sets AGI apart from the competition is its commitment to partnering with its customers, from the initial design, through manufacturing and installation. The company's teams of engineers and project managers work to build the solution that is right for the application and right for the customer. With manufacturing facilities in Canada, the United States, Brazil and Italy, these facilities and teams work together to deliver the right combination of conveyors, storage, controls and any other relevant equipment required for the project.

Many customers deal with various companies who all offer a different component needed for the project, whereas AGI works to provide the fullsystem, reducing the number of suppliers needed.

COMVEX, the largest bulk raw material handling terminal in the Black Sea, partnered with AGI on its grain terminal at the Port of Constanta in Romania. This site consists of silos from AGI FRAME, bucket elevators from AGI Union Iron, bucket elevators and chain conveyors from AGI PTM, chain conveyors from AGI Tramco and enclosed belt conveyors from AGI Hi Roller.

From multi-million dollar port terminals, to smaller co-op inland terminals, AGI works with its customers to deliver market-specific solutions through their range of conveyors and complementary range of products and services.









Negrini company, established in 1967, specializes in engineering and manufacturing a comprehensive range of grabs and buckets for rope machines and crawler mounted cranes; they are employed to do many jobs. Negrini buckets and grabs are very well-known for quality as well as for the very accurate and skilful engineering work; in fact Negrini supports their clients by analyzing the job to be done and, if needed, by adjusting the standard design of grabs and buckets to enhance their performance once in operation.

VIA TORRICELLI 4 - CASTELFRANCO E. (MO) - ITALY



Vertical cylinder clamshell grab from Negrini for grain and other cargoes



Excavator buckets are designed to handle a wide range of materials, including grain. They operate by loading and unloading

these cargoes. They are mounted on crawler excavators, selfpropelled wheeled excavators and trucks equipped with cranes. Excavator buckets are used widely in the agricultural and forestry sectors.

Grab manufacturer Negrini does not limit itself by only selling a standard type of clamshell equipment for the agricultural sector. Close study of customers' needs including the analysis of loads and the type of operation that the equipment will have to perform -– are an integral part of the company's approach which ensures the construction of a highquality, useful and durable bucket.

The company

distinguishes between its equipment with the abbreviations LM (light material), GP (general purpose) and HD (heavy duty). Negrini takes into account the weight to be handled and the work shifts to which the bucket mounted on the excavator will be



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ENGINEERING & EQUIPMENT

subjected. Light buckets are used for handling brushwood and agricultural products, heavy buckets for loading and unloading waste or building materials.

The main strengths of the hydraulic clamshell grab at vertical piston are:

- $\boldsymbol{\diamond}$ high opening speed provided by the structured hydraulic system;
- option to use the bucket in longitudinal or transverse orientations;
- almost complete absence of boxed areas limits the buoyancy effect;
- option to use high pressure for enhanced speed and power; and
- easy low-cost maintenance.
- Other important areas include:
- the shape of the new shell allows for the transit of materials without obstacles and helps continuous release when unloading, without sudden surges of material;
- the bucket is smaller in height and can be raised higher than traditional buckets;
- the bucket can be fitted with a free or motorized 360° rotator. The free rotator allows for natural adaptation of the bucket orientation. This rotator permits free rotation of ±50° with automatic return to the original position by exploiting the weight of the bucket. Extensions can be fitted if required;
- the shortness of the blade makes it possible to apply a highly concentrated force, giving the buckets high pressure per linear millimetre for maximum closing force — this allows for more effective filling and limits bucket lifting with a marked cutting effect on the terrain upon bucket closure, facilitating extraction;
- when possible, Negrini carries out operating tests using electronic instruments fitted to the bucket in order to check the evolution of flow rates, pressures, back pressures, and good general operation; and
- the piston rod is located in the upper part of the bucket where it is protected from the material and remains clean. The hydraulic fluid passes through the rod and drives the jack, the flexible supply pipes are in the upper part of the bucket and remain within a safe area.





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Cleveland Cascades supplies three loading chutes to ADM for grain cargoes



www.drycargomag.com

Three Cleveland Cascades loading chutes are now in constant use at ADM Ama Louisiana in New Orleans, USA, where they are used to handle a variety of grain cargoes.

The chutes, commissioned in October 2018, are its 1700 size systems at 39.62 metres extended and 11.62 metres

retracted. The chutes are designed for loading from a fixed head chute and are operated via a remotely mounted drum type hoist system.

The cascade chute are fitted with a comprehensive suite of electrical components necessary for safe operation and control, providing signalling for any

potential blockages. All of the functions provide feedback to the control system for the shiploader with safety limits being interlocked with the conveyor system feeding the chute.

The systems are in place to handle wheat, soy beans, milo, corn, corn meal and DDG at a maximum capacity of 3,000 cubic

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Our worldwide reputation is built on high quality, well-engineered, robust, high performance chutes, backed up by excellent customer service and global lifetime product support.

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metres per hour. The head chute deflectors are lined with 6mm ceramic tiles and cones lined with 4mm ceramic tiles for abrasion resistance.

Each of the chutes was supplied with a 360° trimming spout with a 3.96m outreach from the chute centre line with manual adjustment for spout inclination used to adjust material trajectory for differing materials.

The chutes can be used for loading both with the shroud up and the shroud down for viewing of the material flow, initial loading of small barges and full loading into typical vessel hatches.

GLOBAL EXPERT IN BESPOKE DRY BULK LOADING CHUTES

Cleveland Cascades is a specialist in the design and manufacture of bespoke dry bulk loading chutes. Based in the North East of England, the company has built a population of over 650 systems, working in bulk handling facilities worldwide.

Cleveland Cascades is best known for its Cascade controlled flow technology chute, which uses a series of inclined cones, inside a retractable cover, to control dust pollution at source, while at the same time minimizing both material degradation and segregation. This technology has established the company as a global force in ship and silo loading chutes.

The company's range of free fall chutes, complement the Cascade and have applications in tanker loading, vehicle loading as well as ship & silo loading.

Cleveland Cascades has developed a worldwide reputation for quality, wellengineered, robust, high performance chutes, backed up by excellent customer service and global lifetime product support. DC:









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Liebherr LHM 600 and LHM 550 lifting in tandem.

Technical specifications of RHB's new Liebherr LHM 550

Lifting capacity:	144 tonnes
ib length:	54 metres
Lifting height:	45 metres
Crane height:	75 metres
Crane width:	14 metres
Axles:	10, with 80
	wheels in total
Crane length:	24 metres
Own weight:	439 tonnes
Tandem lifting:	216 tonnes

Location

Waalhaven Noordzijde 4 3087 BL Rotterdam, the Netherlands Port number: 2157



Quicker handling of advanced project and heavy cargo in Rotterdam

Second mobile shore crane for RHB Stevedoring & Warehousing

Rotterdam stevedore company, RHB Stevedoring & Warehousing, has bought a second mobile shore crane for loading and unloading heavy lift, offshore and project cargo: the Liebherr LHM 550.

With the LHM 550 and the LHM 600, RHB is the proud owner of the two largest mobile shore cranes in Rotterdam. The cranes have a lift capacity of 144 and 208 tonnes and an impressive reach of 54 and 58 metres respectively.

Additionally, they are fast, flexible and accurate, ensuring that times for loading

and unloading sea vessels are reduced considerably.

TANDEM LIFT CAPACITY 216 TONNES

When used in tandem, the cranes have a combined lift capacity of 216 tonnes, ideal for handling long-size cargo (e.g. windmill towers, windmill blades and rails for railroads) fast and professionally. The mobile Liebherr LHM 550 and LHM 600 can be deployed at every location on the 730-metre RHB quay. The enhanced crane capacity contributes to the increasing project cargo handling in the port of Rotterdam.

PROJECT, OFFSHORE AND HEAVY CARGO SPECIALIST

RHB specializes in handling and warehousing heavy lift, offshore and project cargo, such as transformers, turbines, windmills, windmill blades, tunnel boring machines, offshore cargo, and dismantled cranes and engines.

The company was incorporated in 1930 and is among the oldest stevedore companies in Rotterdam. RHB has its own quay of 730 metres and boasts 15,000m² of warehouse space and 30,000m² of open storage space.

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Project cargo & warehousing activity in Polish sea ports

Morska Agencja Gdynia (MAG) is one of the longest operating transport and logistics companies in the Polish market, guaranteeing reliable delivery of cargo to any location in the world — by sea and by land.

MAG has become the partner brand of exporters and importers across the world, shipping companies, shipping lines, freight forwarders, ports, maritime, customs and border offices, banks, financial institutions and insurance companies. MAG's specialists are eager to meet the most complex logistical challenges. The company charters ships and arranges road and rail transport. It also handles heavy and oversized items, loose and liquid cargo, bulk and general cargo. MAG stores and distributes the cargo its clients entrust it with in modern warehouses and bonded warehouses.

The company's roots go back to the 1930s, when Polska Agencja Morska (Polish Marine Agency) was founded. The broad range of its operations is the result of several decades of development, since the establishment in 1951 of a state-owned company under the name Morska Agencja w Gdyni (Marine Agency in Gdynia). At that time, the company represented foreign shipping lines, shipping companies and P&I clubs in Poland. In Polish ports, it provided agency services to Polish and foreign ships, gradually increasing the range of its operation to include ship charters, port and container freight forwarding and crewing services for Polish seafarers on foreign ships. Following political and economic transformations in the early 1990s in Poland, the company transformed into an employee-owned company under the name Morska Agencja Gdynia Sp. z o. o. (Gdynia Marine Agency Ltd).

To strengthen the company's position on the competitive market, it focused on complex cargo services in international transport.

OVERSIZE CARGOES (PROJECT CARGO)

MAG offers sea transport of oversized cargoes and heavy goods, particularly demanding from the logistical and technical perspectives. The company cooperates with shipowners who have extensive experience in carrying such objects and operate specialist 'heavy lift' type vessels. Cranes on board their ships have load capacity of even up to a thousand tonnes.

For many years MAG has been acting as an intermediate in the transport of large cargoes such as heavy construction elements or vessel hull units. The company



ensures the safety and economic efficiency of operations and offers open-sea towage of drilling platforms, ship hulls, steel structures, containers, gantries and other large and heavy items globally.

MAG specializes in the shipment of wind turbines. Its vast experience enables it to provide customers with comprehensive logistical handling of transport from the manufacturer to the wind power station construction site.

The company's comprehensive services in the field of organization and management of transport and logistics chain of project cargo type goods in export, import and transit, are provided to Polish and foreign customers. Each transport operation of this kind is different and requires close cooperation with customers, openness to creative solutions and a number of detailed technical arrangements.

WAREHOUSING

MAG stores and distributes customer cargo in modern warehouses and bonded warehouses. The company owns and leases warehouses in logistically strategic locations in Poland (including temporary and bonded warehouses), which makes cargo transport much easier and cheaper.

Warehouses of the Morska Agencja Gdynia are located in key places for transport in Poland. The optimal location is key to a simple logistics organization and a reduction in import costs. Warehouses are adapted both for shipment of products transported by sea and rail. MAG's agencies are equipped with modern solutions, high storage systems and shelving. They also meet all safety standards.

SERVICES OFFERED:

Storage, loading/unloading of containers, transhipment, collection, co-packing, domestic and foreign distribution, handling heavy goods/oversized cargoes, transshipment of bulk goods and others.

SECURITY AND SAFETY:

A+ class buildings, fenced areas, equipped with alarm and fire protection system with smoke vents, warehouse with automatic heating system HACCP certified, fully insured.

STOREHOUSE IN GDYNIA

Recently, MAG launched new storage space of 4,500m² in Gdynia, close to the port. The new building has 3,500 places on the storage racks and 1,000 places on the block storage. Storage space can function like bonded warehouse, temporary storage warehouse or reloading area under customs supervision. The storage space is a mere 300m from BCT (Baltic Container Terminal in Gdynia Port).

STOREHOUSE IN PANATTONI PARK IN GDANSK

Recently a new storage space of 3,400m² was launched in the Panattoni Park logistics centre, located in Gdansk, a short distance from the port. In the new building, there are 1,000 places on offer on the storage racks and 2,500 places on the block storage. The building provides eight ramps and functions like bonded warehouse, temporary storage warehouse as well as reloading space under customs The storage space is supervision. dedicated towards reducing transport costs from Gdansk terminal to Gdynia, enabling clients to store and handle cargoes in Gdansk.

DARLOWO **P**ORT

The modern Darlowo Port has its own handling wharfs. Here MAG has warehouses and paved storage yards, with a total area of more than 17,000m². MAG offers comprehensive services to individual clients and forwarding companies: land transport by rail and by road, transloading and sea transport to a specific port. The terminal has the ISO 9001 certificates, and the warehouses meet the sanitary and GMP standards.

Morska Agencja Gdynia

Morska Agencja Gdynia organizes transloading in all sea and inland ports across the world. The range of services



covers all kinds of operations associated with securing cargo, preparing loading plans, supervision, reporting and documentation. MAG takes advantage of its numerous, enduring contacts with terminals, to provide its clients with a selection of suitable transloading technologies, while at the same time ensuring the safety and economic efficiency of operations tailored to the individual needs of clients.

Morska Agencja Gdynia / Poland operates in many different areas and are always open to new projects.

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Enstructure's Memphis terminal acquires 900,000ft² warehouse from Louis Dreyfus

In December, Enstructure acquired a 900,000ft² warehouse and the assumption of a 38-acre long-term land lease with critical rail access expansion by its Memphis-based terminal, Fullen Dock & Warehouse (Fullen Dock). The terminal infrastructure expansion, which is adjacent to Fullen Dock's current facility, will provide the company with an expanded footprint and the ability to service unit trains in the high-growth Memphis market. Fullen Dock acquired the warehouse and land lease from an affiliate of Louis Dreyfus Company (Louis Dreyfus), a leading merchant and processor of agricultural goods. In conjunction with the acquisition, Louis Dreyfus will remain a valuable customer of Fullen Dock through a warehouse lease agreement.

"This acquisition more than triples the amount of warehouse storage Fullen Dock can offer to customers and also significantly expands the company's rail infrastructure" said Matt Satnick and Philippe De Montigny, Co-CEOs of Enstructure. "Memphis is a key logistics hub and we are thrilled to expand our presence in that market. We look forward to our new partnership with Louis Dreyfus."

Fullen Dock's extensive operations include three floating docks providing continuous service during high and low river conditions, 1,325,000ft² of warehouse storage, over 900,000ft² of paved outside storage, a construction and demolition landfill and 740 acres of property within six miles of Downtown Memphis. In addition, Fullen Dock sells more than one million tonnes of limestone aggregate annually. Fullen Dock maintains a fleet of 50 trucks and 100 trailers and provides a direct connection to the Canadian National (CN) Railway. The company also performs river fleeting and tug services and has an extensive list of mobile equipment, transloading conveyors, material handlers and a 100-tonne capacity cable crane. Earlier this year, Fullen Dock was designated as a Foreign-Trade Zone (FTZ).

"This transaction allows Fullen Dock to offer customers additional covered storage as well as unit train service, both of which are in short supply in the Memphis market" said Marvin Frick, President of Fullen Dock. "When combined with the vast amount of industrial land available for development and our FTZ designation, Fullen Dock becomes a very attractive destination for customers looking to locate their facility in, or move their cargo through, the Memphis area."



Looking west toward the Mississippi River.



ABOUT FULLEN DOCK & WAREHOUSE

Fullen Dock & Warehouse is a full-service river terminal, warehousing, trucking, limestone supply and logistics company located at Mile 740 of the lower Mississippi River, approximately six miles north of Downtown Memphis. Fullen Dock clients include barge brokers, freight forwarders and manufacturers requiring barge services, harbour and tug services, transshipment, trucking and storage within the Mid-South and to other continental U.S. regions. Founded in 1979 in Memphis, 'America's Distribution Center', Fullen Dock is located near the junction of I-40 and I-55, with direct rail access to Canadian National (CN) Railway.

ABOUT ENSTRUCTURE

Enstructure LLC, Fullen Dock & Warehouse's parent company, owns and operates a network of dry, liquid and breakbulk terminals and logistics assets on the East Coast and Inland River System of the United States. Enstructure provides full-service and transparent logistics solutions to some of the world's largest companies. Enstructure's terminals handle commodities used in the energy, agriculture, manufacturing, construction, and public safety sectors that touch every aspect of daily life.

Dixie Cullen covers Houston's warehousing needs

Dixie Cullen is Houston's premiere heavy lift warehousing provider. Established in 1995, Dixie Cullen has contributed directly to over 75 capital projects in the last 25 years.

What began as a rigging company raising/lowering complete steel mills, chemical refineries and nuclear plants globally, has evolved into the Dixie Cullen of today. While no longer directly engaged the construction of individual capital projects, Dixie Cullen has taken on the trusted role of facilitating the success of multiple projects simultaneously. By providing the equipment, facilities, personnel and expertise, Dixie Cullen enables and enhances the ability of shippers, brokers. and engineering/construction firms to execute their major projects while reducing capital expenditure exponentially.

Dixie Cullen provides three facilities that are close to Port Houston with over 500,000ft² of indoor space, 70,000 of which is humidity controlled, along with 40 acres of outside stabilized and concrete yard. The company has stored a variety of material and equipment; a very small crosssection of examples include: rice, cotton, plywood, automotive engines, automobiles, boats, steel (coil, sheet, bar, beam, stainless,) aluminium (rolled, ingots,) compressors, pipe spool skids, pressure vessels, heat exchangers, cooling towers, wind-turbine generators, solar panels, presses, lathes, injection moulding machines, canning lines, and CNC machines. The company is also able to offer FTZ Storage at its Houston warehouse.

The challenges of storing different products include identifying and mitigating cross-contamination or spillage risks, space allocation planning, and operations system development. The two key areas that require considerable focus when dealing with myriad cargo, equipment and personnel. The quality and composition of these aspects are often overlooked, deprioritized, or ignored deliberately in some organizations. In this industry these two aspects of business often have the highest impact on safety, service, and profitability. The challenge of maintaining appropriate fleet composition, prepared to handle cargo from 200 lbs. to 200,000 lbs. safely, is a never-ending process of analysis and Additionally, when one refinement. considers the increasing labour shortages in skilled trades, rising wages, and waning generational interest in this work, labour starts to factor heavily into the business.



Though equipment and personnel are major challenges in this type of organization, Dixie Cullen has applied pragmatic solutions; the company takes care of its people and their gear. By maintaining its equipment with martial diligence and challenging its people to live a zero-defect safety culture, Dixie Cullen has overcome a few of the most difficult challenges in this industry, with overt positive impact.

The most recent cargo of note include storage of a 283-tonne transformer; pressure vessels, heat exchangers, power buildings and pipe spool modules for the \$800M INEOS project in La Porte; wind tower turbine generators for national distribution, and the glass used to build the Museum of Fine Arts, Houston exterior façade.

Dixie Cullen has been a staple in the Houston logistics industry for over 25 years now. While some organizations may rest on their laurels, Catherine James, President at Dixie Cullen, has chosen a wholly different position. Though she works 15-hour days and is on call 24/7, she has carved out time to give back to the industry. Year after year, she has advocated for, participated in and presided over, organizations dedicated to diversity in leadership and gender equality in industry. Not only has she taken on massive responsibility within ABWA (American Business Women's Association), she is a member of the WBENC (Women Business National Council) and contributes her personal time to mentoring and coaching aspiring business professionals. (myself among them). Her character, integrity, and perseverance have garnered the respect of her competition, colleagues and employees alike.



Solent Stevedores receives new Gottwald mobile harbour crane



Mobile harbour crane weight testing.



An infrastructure upgrade in partnership with ABP's Port of Southampton has seen Solent Stevedores, a UK port services operator, take delivery of a new $\pounds 3$ million quayside crane which supplements seven other high-capacity cranes operated by the company in the port.

The new Gottwald HMK 6507b mobile harbour crane forms a key part of bulk operations at the company's site at the Port of Southampton where more than one million tonnes of dry bulk cargoes are handled each year.

Weighing in at 420 tonnes and with the ability to lift 125 tonnes, it has been specifically designed for working a variety of cargoes arriving at the port.

Project cargo has been a significant area of growth for Solent Stevedores over the past few years where the range of cargo handled has included yachts, wind blades, trains, cable drums and power station equipment. Solent Stevedores specializes in five main areas of international shipping providing award winning services in general cargo operations, cruise services, rail and fruit terminal operations and container handling.

The family-owned company started operations 20 years ago and, in a fairly short space of time, has become the leading stevedore in the Port of Southampton and one of the largest in the UK.

Project cargo handling with Konecranes Gottwald mobile harbour cranes

Konecranes Gottwald mobile harbour Cranes were introduced onto the market in 1956. The universal machines are popular in ports of all sizes for use alongside all types of vessels. They can even replace purpose-built machines. The eco-efficient mobile harbour cranes are used for all type of applications including containers, bulk, general cargo and project cargo. They provide maximum lifting capacities of up to 200 tonnes and maximum load moment per crane of up to 4,032 metric tonnes. In tandem lift operation they can handle project cargo up to 400 tonnes.

FOR PROJECT CARGO HANDLING MOBILE HARBOUR CRANES OFFER MANY ADVANTAGES:

- mobility and independence of the quay infrastructure;
- versatile thanks to many types of quickchange lifting gear;
- high-performance machines with high lifting capacities;
- low specific investment costs for equipment and quay infrastructure;
- comparatively light construction (in comparison to purpose-built machines); and
- high resale value

RECENT PROJECTS

Recent projects where Konecranes Gottwald mobile harbour cranes offer terminal operators high flexibility in cargo handling including project cargo handling are:

- Mardsen Point, New Zealand
- Port of Brownsville, USA
- Rotterdam, Netherlands

These projects also highlight the ecoefficient drive options of Konecranes Gottwald mobile harbour cranes like the innovative drive system meeting EPA Tier 4f and EU Stage V emission standards (Port of Brownsville) and the external power supply (Rotterdam).

SMART CRANE FEATURES

Konecranes offers smart crane features for their Konecranes Gottwald mobile harbour cranes which provide:

- Ergonomics: the crane is user-friendlier and thus easier to operate.
- Efficiency: handling rates are increased, wear is reduced and downtime is minimized.
- Safety: damage to crane, load and quay infrastructure is avoided.

KONECRANES WINS MOBILE HARBOUR CRANE ORDER FROM NORTHPORT NEW ZEALAND



Northport ordered a second Konecranes Gottwald mobile harbour crane for its deep-water facility at Marsden Point.

In the third quarter of 2019 Northport Limited ordered an eco-efficient Konecranes Gottwald Model 6 mobile harbour crane in the G HMK 6507 variant for their deep-water facility at Marsden Point, on the north island of New Zealand. The crane will be delivered and commissioned in the first quarter of 2020. It will expand the facility's container handling capacity and help to handle general cargo and bulk materials.

With this new crane, Northport can now serve container vessels up to post-Panamax class. The crane's maximum lifting capacity of 125 tonnes extends Northport's flexibility in handling general and heavy cargo. Equipped with a motor grab, it can also handle bulk materials. In addition to the eco-efficient diesel-electric drive, an external power source can be used to operate the crane, which gives the possibility to use back-up power options and complies with the New Zealand government's strict guidelines for sustainable energy use.

KONECRANES WINS ORDER FROM TEXAS FOR MOBILE HARBOUR CRANES



Konecranes Gottwald Model 6 mobile harbour crane with the new drive system handling heavy steel coils. Two similar cranes started work in the Port of Brownsville in December 2019.

In June of last year, Brownsville Navigation District of Cameron County ordered two Konecranes Gottwald Model 6 mobile harbour cranes to increase its dockside handling capacity in the Port of Brownsville, Texas, USA.

Giuseppe Di Lisa, Sales and Marketing Director of Konecranes' Business Unit Mobile Harbor Cranes: "The two new cranes are the right choice for the Port of Brownsville, which needs to increase its handling performance while reducing its impact on the environment without sacrificing versatility and flexibility. These mobile harbour cranes will come into their own in this port, which handles many different types of cargo."

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For project cargo handling crane operators can rely on following features: **Load anti-sway:** The load anti-sway that can be switched on or off as needed ensures better control of the load in the slewing and luffing motions typical for mobile harbour cranes. The load anti-sway is not only beneficial for operators with little experience, but also assists senior staff.

X-Y control: The joystick motions for slewing and luffing can be converted into a Cartesian coordinate system with X and Y axis. The fine positioning of general and project cargo helps with efficient and safe handling.

Vertical lift assistant: The vertical lift assistant assists the crane operator with lifting general and project cargo. Sensors ensure that the boom head is positioned exactly above the load. This prevents the load from swaying when lifted off the ground, thus increasing safety and handling speed.

Tandem lift assistant: The tandem lift assistant helps to synchronize the motions of two cranes. Only one crane operator is required for operation, either from the tower cab or by radio remote control. This makes handling of very heavy project cargo of up to 400 tonnes safe and easy.

This feature is designed so that the maximum lifting capacities of both cranes can be utilized. For safety reasons, prescribed downrating for manual lifting are no longer required with the tandem lift assistant. In addition, when using a special lifting beam, cranes of different sizes can each be used with their respective maximum lifting capacity.



Konecranes Gottwald Model 6 mobile harbour crane at the Rhenus Deep Sea Terminal, Maasvlakte in Rotterdam.

KONECRANES WINS ORDER IN ROTTERDAM FOR MOBILE HARBOUR CRANE

In the last quarter of 2019, Rhenus Logistics B.V. (Rhenus) ordered an eco-efficient Konecranes Gottwald Model 6 Mobile Harbour Crane for their operations at the Rhenus Deep Sea Terminal, Maasvlakte in Rotterdam, The Netherlands. With commissioning planned for May and handover by June 2020, the crane will handle general, heavylift & project cargo and expand the terminal's container handling capacity. Equipped with an external power supply, it brings Konecranes' Powered by Ecolifting to a new market.

"We've been very pleased with our Konecranes equipment," says Peter van der Steen, Managing Director of Rhenus Logistics B.V."When we took over this terminal some years ago, there were already two 100-ton Konecranes Gottwald mobile harbour cranes in operation. They've been excellent, so four years ago, we bought our first 125 tonner, Model 6, a high-performance crane that gives us the flexibility to handle any kind of cargo. For this new order, we wanted something similar, but with even better energy efficiency, to correspond with the Rhenus Group's commitment to sustainability and to our ambition in Rotterdam for further electrification."

Their fourth Konecranes Gottwald Mobile Harbour Crane is like their previous purchase, a Model 6 crane in the G HMK 6507 variant.

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Large crane part moves through JAXPORT

The Jacksonville Port Authority (JAXPORT) is located in the Southeastern U.S. at the crossroads of the nation's rail and highway network.

Early January this year, skilled dock workers with port partner Patriot Ports moved a large crane support beam through JAXPORT's Talleyrand Marine Terminal. The equipment, part of a ship's onboard crane, was 120 feet in length and weighed 25 metric tonnes.

The part arrived at JAXPORT from Poland aboard the Spliethoff general cargo vessel Sluisgracht. Stevedores lowered the beam onto the terminal before lifting it onto a barge for transport to its destination at a North Florida shipyard where it will be added to a ship as part of a vessel refurbishment.

Talleyrand Marine Terminal offers 4,780 linear feet of berth space, on-dock rail, and is conveniently located near three U.S. interstates, I-10, I-95 and I-75. Jacksonville's skilled workforce offers a variety of labor options, including highly trained master riggers specializing in heavy lift and project cargo.

JAXPORT DEVELOPMENTS IN FISCAL YEAR 2019

- Dry bulk cargoes (which include noncontainerized commodities such as limestone and gravel) increased 19 percent over 2018, with nearly 880,000 tonnes shipped.
- Breakbulk cargoes, including wood pulp, increased 7 percent with 934,600 tonnes moved.
- The port welcomed Flagler County (Fla.) to its Foreign Trade Zone, offering more savings to more Northeast Florida businesses. The latest figures show the value of merchandise entering FTZ Number 64 is more than \$2.7 billion annually, a 60% increase since 2011.

JAXPORT'S FTZ No. 64 CONTINUES TO GROW

One of Northeast Florida's hidden gems for manufacturers is the Jacksonville Port Authority's (JAXPORT's) Foreign Trade Zone (FTZ) No. 64.

An FTZ is a secured site within the United States, but technically considered outside of U.S. Customs' jurisdiction, allowing shippers to clear cargo as it leaves the FTZ while saving on import clearance costs.

 $\ensuremath{\mathsf{FTZ}}$ No. 64 is Florida's largest $\ensuremath{\mathsf{FTZ}}$ by area, and can potentially provide significant



Dock workers with port partner Patriot Ports moved a large crane support beam through JAXPORT's Talleyrand Marine Terminal.



benefits for manufacturers, according to JAXPORT FTZ Manager Deborah Lofberg.

"One of the major benefits is the ability to file a single weekly entry for all foreign merchandise arrivals, rather than on each shipment," Lofberg says. "This feature alone can save companies many thousands of dollars each year."

An FTZ can provide substantial savings, including duty deferral, reduction and even potential elimination, after approval from the FTZ Board in Washington and Jacksonville's local U.S. Customs Port Director.

JAXPORT's FTZ handles a variety of cargoes including food products, vehicles, over-dimensional cargo, leather goods, beverages, furniture, housewares, crafts, and more.

FTZ No. 64 covers nine counties in Northeast Florida with about 400 acres activated within the boundaries of the FTZ, leaving vast opportunities for more customers. Most of the activated space is located within distribution centres but current provisions allow activation at any site approved by U.S. Customs.

Lofberg says the port's role as the Grantee of FTZ No. 64 is an advantage for



manufacturers because "it gives them a one-stop shop. They have one point of contact to walk them through the process."

The FTZ's alternative site framework (ASF) allows Northeast Florida manufacturers to enjoy FTZ benefits while operating within their existing spaces.

Storage and distribution sites located within Baker, Bradford, Clay, Columbia, Duval, Nassau, Putnam, Flagler and St. Johns counties can be approved in 30 days or less under the ASF. Manufacturing plants are normally approved within three to six months.

Lofberg says that the latest figures available show the value of merchandise entering FTZ No. 64 is more than \$2.7 billion, a 60% increase since 2011. In addition, she adds that \$800 billion in merchandise enters FTZs nationwide with manufacturing operations comprising the majority of this number (about \$500 billion).

"All these users cannot be wrong," Lofberg says. "There are benefits to be had and we are working hard to make sure manufacturers throughout the region take advantage of this opportunity." DCt

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MARCH 2020

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Rhenus transports 13 power generators to Turkey for a floating power station



The heavy goods specialist, Rhenus Project Logistics, announced on 13 January 2020 that it was organizing the transportation, handling and storage of 13 enormous MAN diesel engines and their fixtures as part of a complex project. After having been temporarily stored in Cuxhaven, the first six power generators arrived in Turkey by ship at the end of November. They will be used there as a floating power station.

Companies and important facilities like hospitals or schools often suffer breakdowns if the power supply repeatedly fails in places with poor infrastructure. The Turkish energy supplier Karpowership has developed a special solution to cater for this scenario. Decommissioned bulk carriers, heavy-cargo ships and inland waterway vessels are equipped with generators powered by LNG, diesel or heavy fuel oil and they provide power supplies from the water as floating power stations.

Rhenus Project Logistics launched the first part of the project in April – i.e.

transporting the MAN 18V51/60 TS diesel engines, which are 15 metres long, five metres wide and almost seven metres high, from their production site in Saint-Nazaire in France to Cuxhaven. It was necessary to find a ship with suitable cranes to handle the very heavy engines, which each weigh 325 tonnes.

"Until we were able to ship the first engines to their place of deployment, they were initially stored at the Cuxport terminal in a building with sufficient ceiling height so that they were protected from any moisture," says Marcus Janowsky, Project Manager at Rhenus Project Logistics. The engines were moved on self-propelled modular transporters (SPMTs) for this purpose.

Six of the 13 generators then set off on board the *BBC Lagos* on their way to Tuzla in Turkey on 9 November. "The project is particularly important for us, because it firstly demonstrates the excellent co-operation between the different companies and units within the Rhenus Group. Secondly, handling this large and bulky load overland and on the water always requires special sensitivity and very precise planning — and we were able to provide this here," says Marcus Janowsky, summarizing the course of the project. The generators arrived in Turkey at the end of November and were able to be installed. The remaining seven generators are due to be shipped during the next few months.

Overall, Karpowership operates 22 floating power stations in more than ten different countries. According to the energy supplier, they meet the energy needs of about 34 million people.

ABOUT RHENUS

The Rhenus Group is logistics specialists with global operations and generates annual turnover of \in 5.1 billion. Rhenus employs 31,000 people at 660 business sites. The Rhenus Group provides solutions for a wide variety of different sectors along the complete supply chain; they include multimodal transport operations, warehousing, customs clearance as well as innovative valueadded services."

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